

# Canadian Journal of PUBLIC HEALTH

VOLUME 35  
NUMBER 7



TORONTO  
JULY, 1944

---

## Medical Care for All the People

HENRY E. SIGERIST

*Professor of the History of Medicine  
The Johns Hopkins University  
Baltimore, Maryland*

THERE can be no doubt that social security is one of the most acute problems of our time. The many millions of working-men and farmers serving in the armed forces of every country, and the millions of workers, men and women, engaged in vital industries are justified in asking what their future will be after the war. They all have employment today but they remember what conditions were yesterday during the long period of economic depression that followed the crisis of 1929, and they are wondering what life will be tomorrow. Will it be a return to the misery of unemployment, to the dole, the means-test and ill-paid relief work? Or, having accepted the duty to work, will they have the right to work and through their labor to acquire security for themselves and their families? Will they be able to obtain security while preserving and improving their democratic institutions, or will the price for it be the acceptance of tyranny?

Basic issues can be dodged in a short war, but not in a long one like that in which we are engaged. Social security is undoubtedly the major domestic war aim of every country that has not yet solved the problem. It is also implicitly included in the Atlantic Charter. *Freedom from want* will remain an empty promise unless concrete steps are taken now for its realization. It is a great fallacy to believe that this is a post-war issue that can wait until the war has been won; it is as urgent today as the production of airplanes and tanks. Now is the time for legislation in the matter while we have full

---

*The basis for this article was an address given at a meeting sponsored by the Health League of Canada and held in the Railway Committee Room of the House of Commons, Ottawa, on February 10, 1944. The meeting was arranged through the Voluntary Committee on Health of the Senate and the House of Commons.*

employment and money is available. After the war it may well be too late. And this is why in every country today, and particularly in the Anglo-Saxon countries, in Great Britain, Canada, New Zealand, Australia, South Africa, and in the United States, the problem of social security is being studied and debated, and legislation is being prepared or has already been passed. The Beveridge Report will probably stand out as one of the great documents of this war. It has made a profound impression in the United States where thousands of copies have been circulated, and it has been discussed widely by many groups in all sections of the country.

In the United States, in March 1943, President Roosevelt presented to Congress a report on *Security, Work and Relief Policies* which was the result of a three-years' study by the National Resources Planning Board. On the basis of these findings, a Bill was introduced in Congress by Senators Wagner and Murray and Congressman Dingell (S. 1161), to establish a Unified National Social Insurance System. The Bill in no way marks a new departure in American policies but is merely the logical outcome of a movement that can be traced back to the last war. At that time the findings of the draft-boards revealed that health conditions of the population were not as good as might have been expected. In 1928, a year of great prosperity, it was felt that millions of people had either inadequate medical care or no medical care at all. In Massachusetts, one of the best administered states of the Union, one-third of all chronically sick were found to have no medical care whatsoever. A Committee was constituted to study the costs of medical care. It was at work for five years, made a thorough survey of existing conditions and presented its findings in a series of reports consisting of 28 volumes. It is one of the best surveys that have ever been undertaken in the field and can well serve as a model for other countries. The majority of the Committee on the Costs of Medical Care, in its Final Report of 1932, came to the conclusion that group practice through medical centres was the form of medical service that could make the best use of the present technology of medicine and recommended the establishment of some prepayment system that would enable the people to contribute toward the cost of medical care according to their ability.

In 1932 we were at the bottom of the depression and the need for a system that would provide much-needed medical care to all the people was more urgent than ever. Further surveys were undertaken by the Government and various private agencies that provided more facts and figures. In 1935, the Social Security Act passed by Congress established a state-wide system of old age and unemployment insurance and appropriated funds for the extension of public health services. Then, in 1938, it was felt that the time had come to extend social security legislation to the field of health. A National Health Conference was held in Washington that was attended by physicians, public health officers, economists, and representatives of the public. It recommended the further extension of public health services, construction of additional hospitals, provision of free medical services for indigents, compensation for the loss of wages due to illness, and some form of health insurance. These recom-

mentations were embodied in a bill that Senator Wagner introduced in Congress in February 1939 (S. 1620). The Bill was defeated, however, and several other similar bills introduced at that time met with the same fate.

The present war emergency has given the problem of social security renewed significance, and the Wagner-Murray-Dingell Bill endeavors to merge the existing state insurance schemes into a uniform federal system. It proposes at the same time to broaden the scope of social insurance so that it will include health insurance. The Bill is violently attacked by those groups who stand for unchecked free enterprise and oppose all forms of Government planning and co-ordination, and also by the groups who stand for unlimited States' rights and object to any form of interference by the Federal Government. They overlook the fact that uncontrolled free enterprise has led the country, and not only ours, into depressions and wars, and also do not see that with the present means of transportation the country has become much more uniform than in the past. If the Wagner-Murray-Dingell Bill is defeated, as it is likely to be, since our present Congress is very conservative, we may expect another similar bill in the near future because the need will remain as acute as ever.

This raises the question why there is such a great demand for social security legislation. Opponents like to tell us that we have become soft. "Look at the pioneers," they say, "did they call upon the state for protection in social matters? They worked hard and saved money so as to have a reserve from which they could draw in sickness and old age." All this is true, but we are no longer in the pioneer days. Conditions have changed basically in the last hundred years. After two great industrial revolutions, we find ourselves in a highly differentiated, highly specialized society in which the majority of all gainfully employed persons are wage earners or salaried employees. What does this mean? It means that the great majority of our people depend for a living on the labor market, a market they do not control. Hence there is a deep feeling of insecurity and an increasing demand for a system that will permit the people to pay for basic services according to their ability while they are at work and will give them a right to these services when they are out of work through no fault of their own.

The idea of social insurance is by no means new but has a history of over 60 years. It is not a revolutionary, but, on the contrary, a basically conservative issue. It does not tend to overthrow the existing economic order but provides a corrective mechanism that mitigates its hardships. We can distinguish different periods in the history of social insurance. The beginning was made in Germany when Bismarck, after a long parliamentary struggle which lasted over six years, established in 1883-1889 a national system of social insurance that included accident, sickness, invalidity, and old-age insurance. It was a great experiment that had never been tried before and created a great deal of interest all over Europe. Another period began in England when in 1911 the National Insurance Act was passed under Lloyd George and Winston Churchill which, for the first time, included unemployment insurance. World War I, which led to intensified industrialization and was followed by social

unrest in many countries, raised the problem of social security anew and legislation was passed in the following years in many countries. The great depression of the 1930's that threw millions of people out of work and created an acute relief problem was a new stimulus for such legislation and a number of South American Republics adopted some form of social insurance, Chile first, then Brazil, Peru, Venezuela, Costa Rica, and Ecuador. Mexico has made similar provisions. In the present war, industrialization has proceeded in an unprecedented way, and the time has come when we no longer can evade the issues.

In America, we were able to get along without social insurance for a long time because conditions were totally different from those in Europe. Ours was a large, thinly populated continent with immeasurable potential wealth in agricultural land and natural resources. Industries developed relatively late and a constant stream of immigration provided an inexhaustible reserve of manpower. In times of economic crisis, people could move West and settle down on the land. Conditions have changed today. The country is settled; we have the most highly developed industry, and immigration has stopped. Conditions are now very similar to those in European countries, and the same needs will of necessity call for similar solutions.

As a physician, I am particularly interested in health insurance. Security in matters of health is one aspect of the great general problem of social security; it is a very important one because all too well do we know the vicious circle of disease creating poverty which in turn produces more disease. Opponents of health insurance like to point out that medical care alone does not guarantee health and that what the people need first of all is a secure job, a decent home, plenty of wholesome food, fuel and warm clothing. Nobody will deny that the standard of living is probably the most important factor in the maintenance of health, and every civilized country is striving to raise the standard of its population. The opponents of health insurance, however, should realize that if we had to enact legislation today that would guarantee all the people a job, a decent home, plenty of wholesome food, fuel and warm clothing, this would require infinitely more radical bills than the one of which they are afraid. As physicians, we cannot wait for the happy days when everybody will have everything. We must try to break the vicious circle wherever we can and must do it without delay. It, of course, is unsatisfactory to restore with nicotinic acid a man who suffers from pellagra and then send him back to the slums. What he needs is food, but if we cure him, we at least restore his capacity to work and give him the physical possibility of making a living.

There can be no doubt that health conditions have greatly improved in Canada as well as in the States. A rising standard of living for increasing numbers of people, progress of medical science, improved and steadily expanding public health services have made life much less hazardous than in the past. Death rates have dropped, and the average life expectancy has increased. But are health conditions good enough, are they as good as they could and should be? Is it not so that even the most advanced countries still carry an enormous



burden of unnecessary illness, much of which could be prevented? In Canada you still lose 6,000 people every year from tuberculosis, while 30,000 are under treatment. You lose every year 900 young women, mothers and wives, from causes related to childbirth, and 15,000 children die during their first year of life. We still have venereal diseases ravaging the population, although we know these diseases and have effective treatments that would permit us to eradicate them. Medicine has infinitely more to give than the people actually receive. Why these shortcomings? The reason is easily apparent. Today in this, as in many other fields of human endeavor, technology has outrun social organization. We have the scientific and technical means needed to overcome many diseases, but not yet the social organization of medicine that would permit us to apply them fully. Science progressed rapidly from the seventeenth century on; medicine became scientific, highly technical, highly specialized, and very costly. The cost of medical care grew more rapidly than the purchasing power of the population. It should be fairly obvious that a new medical science called upon to serve a new type of society, requires new forms of medical service. We must create the social organization of medicine that will permit us to make full and unrestricted use of its technology.

What can be done? Let us agree first on some general principles. I think we agree that all the people should have medical care, irrespective of race, creed, sex, or economic status, and irrespective of whether they live in town or country. I think we also agree that all the people should have not just some medical care but the best possible care. The whole modern technology of medicine should be available to them, including the services of the general practitioner, the specialist, the nurse, the hospital, and laboratory. We also agree that prevention is better and also cheaper than cure, and that preventive medical services should therefore be in the foreground of all activities. For 5000 years people have fallen sick and, once sick, have called upon a doctor, who endeavored to restore them to health. Today we already have the knowledge and means that would permit us to reverse this old relation. The doctor in the future must see the people before they become seriously ill and must advise them how to maintain their health. More and more he will become an educator.

The provision of medical services to the population has two aspects, one economic and one medical. Both must be considered and studied together because they are inseparable. Indeed the best economic plan defeats its own purpose if the money is used to finance a poor type of medical service, and on the other hand the best medical plan must collapse if it is not properly financed. Illness is an unpredictable risk for the individual family, but we know fairly accurately how much illness a large group of people will have, how much medical care they will require, and how many days they will have to spend in hospitals. In other words, we cannot budget the cost of illness for the individual family but we can budget it for the nation. The principle must be to spread the risk among as many people as possible and to pool the resources of as many people as possible. In other words, we must apply the principle of insurance with which everybody in America is familiar.

In Canada as well as in the United States there has been a great deal of experimenting in recent years with voluntary health insurance plans. I am familiar with most of them and in 1940 I spent ten weeks travelling through the States in order to see a large number of such plans in action. We have private group clinics that give medical care to people on a pre-payment plan. The best known clinic of that type is the Ross-Loos Medical Group in Los Angeles that serves about 75,000 people through a large medical centre and branch clinics staffed by over 80 physicians. For a monthly contribution of \$2.50, it gives complete—and I may add excellent—medical care, including hospitalization, to its subscribers. I am sure that a policeman in Los Angeles served by the Ross-Loos Group gets more and better medical care than many rich men in New York, because he is not afraid of the cost and, at the slightest symptom, calls at the clinic without hesitation. Other similar groups have been organized along the line of consumers' cooperatives, and the best known example of that type is the Farmer's Union Cooperative Hospital Association in Elk City, Oklahoma, which was built up and developed by Dr. Michael A. Shadid. The Hospital is owned and maintained by the cooperators and has given excellent services to farmers of very moderate income. At the moment, medical service plans controlled by medical societies are in operation in 16 of our states and in several localities of three other states. They cover about 1,000,000 individuals but are, as a rule, unsatisfactory because they protect the people only against major health risks. How great the demand for insurance has been demonstrated by the rapid development of the Blue Cross Hospitalization Plans which, today, include about 14 million people. The protection they offer, however, is limited to hospitalization and does not include medical services.

The experience of the last 15 years in the United States has, in my opinion, demonstrated that voluntary health insurance does not solve the problem of the nation. It reaches only certain groups and is always at the mercy of economic fluctuations. The Blue Cross Plans were launched at the bottom of the depression and developed with an expanding economy. It is not difficult to foresee what would happen to them if the country were hit by another depression when people would be unable to pay premiums. Group clinics appeal primarily to employees with steady income—school teachers, municipal and similar employees. If the majority of their subscribers consisted of industrial workers who suddenly might be out of work, the clinics would necessarily collapse.

Hence, if we decide to finance medical services through insurance, the insurance system must be compulsory. It should include as large groups of the population as possible. It is a great weakness of most European systems that they are limited to the low-income groups, while we know that the provision of medical care is a serious problem for practically all brackets of the middle class. Health insurance must include not only the wage earner but his family members as well, and it should also include self-employed individuals. It must provide complete medical service, preventive, diagnostic and curative, by general practitioner, specialist, nurse, hospital, etc. People should have complete security in health matters.

Should the system be centralized or de-centralized? That depends on conditions prevailing in different countries. In the United States, Senators Wagner and Murray think that the entire social insurance system should be centralized in the hands of the Federal Government so that the people would be guaranteed equal benefits irrespective of state lines. Our workers move about a great deal, and the experience with state insurance systems has revealed many hardships. A dam builder may be working in Tennessee one year, in Colorado the next and thereafter in the state of Washington. If he happens to have an accident, the compensation to which he is entitled will be totally different according to the state in which he happened to be working at the time of the accident, because every state has a different compensation law. The same is true for unemployment insurance. An unemployed worker in New York receives more than twice as much compensation for a much longer period of time than one in the state of Arkansas. It was felt therefore that a unified Federal system would increase the security of the people. I know, of course, that conditions are different in Canada and that you have to plan along provincial lines.

There is another technical question that is not easy to solve, namely, the remuneration of the physicians. There are three ways of remunerating doctors under a health insurance scheme. One, which seems to be the most popular with doctors because it comes closest to the traditional form of payment, is the so-called fee-for-service system according to which doctors are remunerated for every individual service according to a tariff. In my opinion this is the most unsatisfactory system because it always calls for a great amount of paper work and red-tape. The physician has to itemize his bills, which in turn have to be checked by the insurance fund in order to ascertain that the services were justified. Expensive services, moreover, usually have to be especially authorized by the fund. Another source of dissatisfaction is that the fee tariffs are usually made on a unit basis and that the unit varies from month to month according to the money available in the fund. The doctor, therefore, never knows what amount he may expect for a given service.

The capitation system under which payment from the insurance fund is made, not on the basis of services rendered, but of the number of patients registered with the doctor, is better because it undoubtedly greatly simplifies bookkeeping. It is, however, impossible to bring the specialist into such a system. The third, and in my opinion by far the best method, is for the funds to appoint physicians on salaries graded according to experience, responsibility, and hazard. The advantages of such a system are obvious. It eliminates a great deal of unnecessary bookkeeping, permits provision of adequate remuneration to doctors in rural and far distant districts and guarantees the physicians an income on which they can count. I am well aware that the idea of being salaried employees does not appeal to the majority of doctors, because it is not the traditional form of remuneration. They also fear that a salaried system might reduce their initiative. The experience in other countries, however, has shown that if salaries are adequate—and there is no reason why they should not

be adequate—the doctors are very soon reconciled with such a system and appreciate the security and independence it gives them. Nobody will deny that the public health services in Canada as well as in the United States have given a splendid performance with salaried doctors and that excellent medical care is given in such places as the Mayo Clinic or the Johns Hopkins Hospital where doctors are salaried also. We should furthermore keep in mind that most of the progress of medicine was achieved by salaried men such as Pasteur, Koch, Ehrlich, Walter Reed, Welch, Flexner, Banting, to mention only a few.

Health insurance is a method to provide the funds needed for the financing of health services. What kind of services? My own personal view is that, in the future, medicine will increasingly be group medicine practised through medical centres, for the simple reason that this is the form of medical care that can make the best use of the present technology of medicine. The people today need more than a family doctor; they need a family medical centre where they will find the general practitioner, the various specialists, with all the technical equipment needed to give them preventive, diagnostic, and curative services. In the cities it should not be difficult to establish such medical centres that would serve residential districts and working places. In rural districts, particularly in countries like Canada and the States where the population is scattered over wide areas, it would be more difficult. But I think that with the present means of transportation, with airplane and helicopter, it should be possible to bring not only general practitioners, but also specialists, nurses and other auxiliary personnel to the people of rural districts. I am particularly impressed by the great possibilities of the helicopter, which will permit one to take a patient from the top of a mountain and bring him to the operating table with a minimum of delay.

Medical services provided under a health insurance scheme will not be enough to solve the health problems of a nation. We shall still need our public health services in addition. The sanitation of dwelling places, the protection of society against epidemics, the provision of medical services to poor minority groups and many other tasks will remain such that they will require the full state power for their execution. The two services together will promote health, prevent disease, restore and rehabilitate the patients once prevention has broken down. Every country will have to decide on the basis of existing conditions what public health and what insurance services it wishes to have. Personally I believe that ultimately the provision of health services and medical care will become a public service, just as education already is.

Health cannot be forced upon the people. It cannot be dispensed to the people. They must want it and must be prepared to do their share and to cooperate fully in whatever health program a country develops. No bill is perfect from the very beginning. If we had to wait until we had a perfect bill that would satisfy everybody and would solve every problem at once, we would never get anywhere. A beginning must be made and must be made soon because in war as in peace the people's health is one of the nation's most valuable assets.

## DISCUSSION

**QUESTION:** *In cases where the hospital system functions from the larger centres, it will be far more attractive for the physicians in the cities than for those in the rural districts. Would a doctor give the same service there as he would at points where conditions were far more attractive? A doctor to-day usually prefers a city practice.*

**DR. SIGERIST:** I am glad you mention this point because I am particularly interested in the problem of rural medicine. I have studied rural health and medical conditions in a number of countries, in Yugoslavia, in various sections of the Soviet Union, in South Africa and, of course, in the United States. There is no doubt that it is relatively easy to give good and complete medical care to the people in the city where specialists and all facilities are easily available, while it is much more difficult to do so in rural districts. Yet it can be done and I have seen it done in a number of countries.

The goal, in my opinion, must be to bring the same quantity and quality of medical services to the rural population as the city people receive. It may seem ambitious and, of course, is not easy because the people are scattered. The method, I think, should be the following: We already have rural hospitals in a good many places; where there are none we must build them, not only because the people need them but also because we shall never be able to attract well-trained young physicians into rural districts unless they have the facilities of a modern hospital available that will permit them to practise scientific medicine. The hospitals should be developed into fully organized medical centres, staffed with general practitioners, specialists, laboratory technicians, etc., and such a centre could be put in charge of the health work of an entire district. Physicians could be placed at strategic points of the district which would serve as outposts of the medical centre; and where the population is not large enough to warrant the use of a doctor, a well-trained public health nurse could be put in charge of such an outpost. It seems essential to me that these medical stations, whether staffed by physicians or nurses, should be considered outposts of the district centre and should be in constant touch with it. With the present means of communication and transportation, this is entirely feasible. Wide use is already made of the airplane in rural health work in northern Scotland, Australia and Russia. The difficulty with airplanes, however, is that they require professional pilots and landing fields, and this is why I have great hopes in the possibilities of the helicopter, which is much easier to fly and can land anywhere. With these new means of transportation, it will be possible to bring patients from remote regions to a medical centre without delay for examinations, for operations, and other treatments. It will also permit specialists to tour the district and to help the outpost physicians in their work.

You may be interested to know that in the Soviet Union where health services are entirely socialized and all physicians are salaried, the rural practitioner receives a salary that ranges from ten to twenty per cent higher than the salary of the city doctor of equal standing and experience. Why? Because the responsibility of the rural physician is greater and because his job is so

much tougher. I think this is a very justifiable procedure and it obviously also contributes to make rural practice more attractive.

QUESTION: *Could not that be tied in with the county health consulting system which is in operation in the Province of Quebec?*

DR. SIGERIST: Of course it could.

QUESTION: *In Russia, where the doctors are on a salary basis, is there a feeling on the part of the laymen that the doctor should have a salary which is adequate to enable him to have the research material he needs, and an adequate standard of living; or is there a feeling that the doctor is required to work too long hours under undesirable conditions? Do the doctors feel that they are receiving an income which compares favourably with the income available to other people in their society?*

DR. SIGERIST: Salaries in Russia are determined by quantity and quality of work—by its social usefulness. The highest paid workers are the members of the Academy of Sciences because it is considered that their work is of greatest significance to the country.

Physicians' salaries are determined by experience, responsibility, and hazard. A doctor with 20 years' experience receives more than one who has been in practice for only 5 years. A physician who is in charge of a large medical centre receives more than one who is assistant in such a centre. And, as I mentioned before, the rural practitioner has a higher salary than the doctor in the city. Physicians in far remote regions, in the Arctic, in inaccessible mountain villages of Central Asia and similar places, have still higher salaries on account of the greater hazard involved, and they also have longer vacations, of six or eight weeks a year instead of the four weeks to which every physician is entitled. Physicians are today among the best paid workers and their salaries are similar to those of engineers.

QUESTION: *How many hours a day are the doctors expected to work there?*

DR. SIGERIST: Before the present emergency, the working day of industrial workers, as you undoubtedly know, was not to exceed 7 hours, and in certain hazardous occupations it was even shorter. The official working day of physicians was 6 hours. This may seem short but it was felt that the doctor should always have time and leisure to study. The emergency created by the war obviously has changed conditions temporarily. Workers are putting in a 12-hour working day and have sacrificed their annual vacations, and the doctors, there as in every other country that is at war, are working day and night.

QUESTION: *In one section of the country the medical profession is divided into two classes, those who advocate state medicine and those who advocate health insurance. Would the speaker care to enlarge on this phase of his submission?*

DR. SIGERIST: Personally I believe that the general trend is toward state medicine, and that the protection and restoration of the people's health will ultimately become a public service to which people will be entitled in every country. Taxation seems a simpler and more equitable method of financing such basic services. It is only just that people with high incomes should be



called upon to contribute more than the actual cost of the medical care they receive, while other people can contribute only part of the cost and people of very low incomes cannot contribute at all. The general principle must be that everybody contribute according to his ability, while all should be entitled to the best medical care that can be provided. State medicine requires a smoothly functioning, efficient, administrative machinery.

Health insurance is another method of financing medical services. It seems preferable to many people because the change is less radical and permits the preservation of some of the traditional forms of medical service. It may therefore well be considered as an intermediate step. In my opinion it is a more complicated and more cumbersome method of financing than taxation, and it will always require Government subsidies because there will always be many people who cannot contribute insurance premiums.

I think every country will have to decide what method is feasible and preferable under existing conditions. In the United States, for example, it would be impossible at the moment to introduce a complete system of state medical services covering the entire population. The people are not ready for it, nor have we developed the type of civil servant that England has and without which it would be difficult to administer such a plan. The best we can hope for today is a system of health insurance embracing large sections of the population and supplemented by Government services.

The resistance against all such plans is very much the same as the one that was experienced in the field of education. For a long time education was considered a private matter of the family in which the Government should not interfere. Once society realized that a democratic community cannot function as long as many of its members are illiterate, the state assumed responsibility and provided a system of free public education. The objections brought against such a plan were very much the same as those brought against state medicine today and yet I am sure that nobody would suggest that we give up our system of public education.

**QUESTION:** *Have you been able through your surveys in the United States to arrive at any conclusion as to the average cost of medical service to the individual to-day?*

**DR. SIGERIST:** The Committee on the Cost of Medical Care found that in 1929, a year of great prosperity, the people of the United States had spent \$30.08 per caput for medical care. The various group clinics operating under a voluntary pre-payment plan found that they could provide medical service including hospitalization, but not including dentistry, for \$2.00 - \$2.50 a month for the individual, or \$5.00 a month for a family consisting of husband, wife, and minor children. Henry J. Kaiser provides in his shipyards complete and excellent medical services including hospitalization to his workers and found that a contribution of 7 cents a day per caput, plus the money that comes in under Workmen's Compensation, not only permits the financing of the services but also pays for capital expenditures.

QUESTION: *And if you were to use organizations of the type you have been discussing, would that be the general cost?*

DR. SIGERIST: Yes. It has been estimated that under our Wagner-Murray-Dingell Bill about \$3,000,000,000 would be available to provide medical services for a 100,000,000 population. The Bill does not foresee dental services in the beginning, because it was felt that we have not enough experience yet in dental economics. Dentistry is highly developed technically but still very backward socially since large sections of our population have no dental care whatsoever.

QUESTION: *Would you care to express any opinion as to the relative financial cost of medicine under a health-insurance scheme or state medicine, and the present method of providing medical care?*

DR. SIGERIST: The present method of providing medical care is haphazard and wasteful. Millions of dollars are spent for useless proprietary drugs. We also waste a great deal of money by having many cases of preventable sickness and of premature death. In the United States we estimate that the people lose every year \$10,000,000,000 as a result of illness. This amount is made up of the cost of medical care, the loss of wages, and capital losses resulting from premature death. We must always keep in mind that money spent for the preservation and restoration of health is a self-liquidating investment. By increasing expenditures for health services, we reduce the loss of wages and the capital losses due to premature death. This has already been clearly demonstrated in the case of tuberculosis. A tuberculosis campaign obviously costs money, but every case that is discovered in its early stage and can be treated in time represents a saving to the taxpayer. Should we succeed in overcoming tuberculosis entirely, the saving would be immeasurable.

QUESTION: *Would you care to express an opinion as to what you think should be done in the way of providing training for doctors, nurses, and other social workers in the preventive field?*

DR. SIGERIST: I have definite views on the subject, and I think that our whole system of medical education needs thorough overhauling. We must ask ourselves whether we are actually training the physician that society will require tomorrow, or whether we are still training the physician of yesterday. In the reorganization of medicine that took place in the United States after the Civil War, my own School, the Johns Hopkins School of Medicine, played a very important part. When it was opened, just 50 years ago in 1893, it set a new pattern of medical education. During the last 50 years, great changes have taken place in the world. We had a second industrial revolution which profoundly affected the structure of society. Medicine progressed very rapidly and became highly specialized and highly technical. And yet we still maintain the pattern of medical education that was set 50 years ago. New courses have been added to the curriculum here and there, but the general pattern remains basically unchanged. I feel very strongly that we should bring the social sciences into the medical school. The physician must now, as in the past, have

a thorough scientific training, but he should also be instructed in the social and economic implications of medicine. The opposition on the part of many physicians to health insurance or state medicine is very often the result of ignorance, since many physicians are completely unaware of the basic changes that have taken place in society and completely lack historical perspective. Whoever is aware of historical developments must realize that a new medical science called upon to serve a new type of society calls for new forms of medical service. My School is one of the few in the United States where students are given systematic instruction in the history, sociology, and economics of medicine.

The scope of medicine has broadened considerably, and the social causes of disease must be paid increased attention. Every patient who comes to the hospital is a reminder to us that prevention has broken down, and from every case we should try to learn what should be done to prevent such an occurrence in the future. Once an individual relationship between physician and patient, medicine is becoming today more and more a social institution and we must instruct our students in social medicine. You probably heard that Oxford University has quite recently created a new chair of social medicine.

In our country, most states require a one-year hospital internship before the young graduate in medicine may qualify for practice. In Russia, the young doctors are required to spend a period of time in rural practice as part of their general medical training. In Yugoslavia, all young doctors have to spend a year in social medical services, either in rural or in urban institutions. I think we also should provide some opportunity for our students to acquire practical experience in such fields, and I think that part of the long summer vacation could be used very profitably for such a purpose. We could, in the summer, send out groups of medical students, student nurses, etc., who would assist in Government services, in Indian reservations, among the fruit-pickers of California and Arizona, in poor sections of our South, etc. We know from experience that such Government services are usually understaffed so that they would welcome such assistance, and to the students such a period would be an invaluable experience. The cost should not be exorbitant. Medicine must become preventive medicine, first of all, and the prevention of disease should be emphasized throughout the curriculum of our schools.

*QUESTION: Would you care to tell this gathering what in your opinion is the role played in the various countries by such groups as chiropractors, osteopaths and others? Are they as a rule admitted on an equal footing with what we consider the general practitioner of medicine?*

**DR. SIGERIST:** As a rule they are not. All health insurance systems with which I am familiar admit only duly licensed physicians to their panels. The Wagner-Murray-Dingell Bill does not foresee the admittance of chiropractors and osteopaths.

*QUESTION: Can you tell us whether in universities in other countries courses of instruction in chiropractic and osteopathy are recognized?*

DR. SIGERIST: I do not know of any. They have always been considered as being incompatible with academic medicine. Medical sects or cults, or whatever you may call them, usually develop when academic medicine is neglecting some field. In the beginning of our century American medicine became very scientific and neglected the psychological aspect of medicine. As a result, Christian Science and similar movements developed to fill the gap. Now that psychiatry is highly appreciated and cultivated, these other movements have stopped growing. The same happened in the field of physical therapy which was also neglected for a while because it was not considered scientific enough. And yet the experience of centuries has demonstrated that very good results may be obtained with physical therapy, particularly in the treatment of chronic diseases. Again the gap was filled—in this case by chiropractors, naturopaths, and similar groups. The lesson to be learned is that academic medicine should incorporate whatever methods of treatment promise results.

QUESTION: *I live in a section of about five thousand people. We have state medicine there, but I have discovered that many of the people who have the advantage of this still seek services from other sources. Yet you are in favour of state medicine as something to work towards?*

DR. SIGERIST: I would say this: if the people seek service from other sources, it means that they are not satisfied with the services they get. In Russia, the private practice of medicine was never forbidden and in the beginning while public services were not yet fully developed, many people preferred to go to the private practitioner. Later, when public services had improved tremendously—both in quantity and quality—private practice gradually died out because there was no reason for paying fees to a doctor when it was possible to obtain good, or even better, services free of charge. Something similar has happened in the field of education where public and private schools are competing with each other. In many countries the private schools are still better than the public schools, but in many sections of Switzerland, the country from which I originally came, the public schools had already become far superior to private schools, which were maintained primarily for the benefit of the "dumb" children of rich parents.

It is the responsibility of a Government to see to it that public services are of first-rate quality. To this end, physicians and other employees must be well paid and institutions must be so equipped that physicians can practise modern, scientific medicine. As long as physicians are underpaid, the services will not attract the best type of young doctor. It is also very important for such services to have a satisfactory system of promotion, and they must be kept free of party-political interference.

QUESTION: *It has often been charged by those who oppose state medicine that as the private practitioner, the doctor who is going to give the service, would not become highly paid he would lack an incentive to work, with the result that he would become just a wage-earner, a time-serving working-man.*

DR. SIGERIST: I have often heard the fear expressed that under a system

of state medicine the doctor would become a mere job-holder and would lose interest in his work. I do not think that this fear is justified. Members of other professions, school teachers, university professors, judges, ministers of the church, engineers, etc. are, as a rule, salaried also and we could not say that they have lost the incentive to work. Physicians in the public health services are salaried and have done a splendid job in every country. The great improvement in health conditions is primarily due to their efforts. Under the present system, the average physician's income is not a very high one and the physicians as a whole would be better off under any organized system. Since salaries would be graded, the material incentive would not be lacking. The experience of other countries has shown that after a period of adjustment, physicians welcome being freed from the necessity of charging fees and collecting bills and appreciate the independence and security that such a system gives them.

---

## CANADIAN PUBLIC HEALTH ASSOCIATION

---

### ANNUAL MEETINGS

*November*

6 • 7 • 8

Royal York Hotel

T O R O N T O

---

## ONTARIO HEALTH OFFICERS ASSOCIATION

---

# The Transmission of Glanders from Horse to Man

C. D. McGILVRAY, D.V.M., D.V.Sc.  
*Principal, Ontario Veterinary College, Guelph*

GLANDERS as a disease of the horse appears to have been recognized and referred to by Hippocrates about the year 425 B.C. Since that time the disease has been constantly referred to in veterinary literature. During the eighteenth century, two conflicting views as to the origin of glanders became evident. One group expressed and supported the view that the disease was of contagious origin. Viborg, a Danish veterinarian, published a treatise on glanders during the year 1797 in which he definitely referred to a specific microbe being present in the purulent nasal discharge and the secretions from pustules and ulcers in the skin. His observations and assumptions were well-founded and were corroborated by the discovery and identification of the *Bacillus mallei* (*Pfeifferella mallei*) during the year 1882 by Loeffler and Schütz in Germany, and by Bouchard and Capitan in France. Following this, two Russian veterinarians, Helman and Kilning, produced from cultures of the bacillus the product called *Mallein* which was found to cause a reaction when injected into glandered horses, thus introducing the mallein test for detecting latent cases of the disease. The discovery of the mallein test prepared the way for the final control and eradication of the disease.

Glanders in the horse usually follows a chronic course with a variable period of incubation extending from several weeks to several months. As a result, it is customary to speak of two types of glanders, namely: clinical, and latent or non-clinical.

*Clinical cases* are recognized by definite symptoms commonly known as the *cardinal signs* of glanders: A chronic nasal discharge with or without ulceration of the nasal septum, enlargement and induration of the submaxillary lymph glands, the presence of pustules and ulcers (farcy buds) on the skin of the legs and other parts of the body.

*Latent or non-clinical cases* are essentially pulmonary in type, whereby the disease remains in a concealed state in the lungs in the form of tubercle-like nodules. In many of these cases the affected horse may show slight signs of chronic lung trouble (altered breathing) and is capable of spreading infection by the respiratory secretions for a period of several months before showing recognizable clinical symptoms. These cases are actually more numerous than clinical cases and can be positively detected only by the mallein test.

---

*Presented at the twelfth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, held in the Royal York Hotel, Toronto, on December 15 and 16, 1943.*



## SUSCEPTIBILITY

Glanders is essentially a disease affecting horses, mules and donkeys. Cattle, sheep and swine are virtually immune. Human beings are quite susceptible. Infection usually occurs by inoculation from the nasal discharges of a diseased horse, in making a post-mortem examination, in examining diseased specimens, and while handling laboratory cultures of the bacillus.

## OCCURRENCE AND DISTRIBUTION

Glanders was widely prevalent as a disease among horses in Canada until 1915. Since then the disease has been suppressed and at the present time is entirely eradicated. It still prevails to a considerable extent in some parts of Europe, Asia and Africa. The prevalence and distribution of glanders have always greatly increased during and following all the great wars, and this may be repeated in the present world conflict.

## CAUSE AND TRANSMISSION

Glanders is caused by the *Pfeifferella mallei* (*Bacillus mallei*). The bacillus is present in the nasal discharges and suppurative discharges from the pustules and ulcers (farcy buds) which develop on the skin, especially of the legs. Generally speaking, glanders is spread through the ordinary channels of horse traffic. The infection is usually introduced to the premises through the medium of both clinical and non-clinical cases. Natural infection may take place by any of the following channels: *By ingestion into the digestive tract*: This is regarded as the most common channel of infection through the nasal discharges contaminating the feed or water. *By inoculation through the skin*: This may take place through abrasions of the skin or mucous membrane by contamination with the nasal discharges or pustular secretions. *By inhalation into the respiratory tract*: While this is possible, it is not considered the common or usual channel of infection.



GLANDERS IN HORSE  
Ulcers (farcy buds) on skin of hind leg.

## POST-MORTEM APPEARANCES

Cases of glanders can be diagnosed by means of the mallein test. Owing to the extreme danger of infection in making an autopsy under field con-

ditions, a post-mortem examination is not advised unless undertaken by a skilled person using proper precautions. The post-mortem findings depend on the nature of the case and comprise the following gross lesions:

*Skin lesions.* Clinical cases are characterized by skin lesions consisting of nodules, pustules and ulcers on the skin, especially of the hind leg below the hock and on the inner thigh.

*Respiratory lesions.* Nodules and ulcers may be present on the surface of the respiratory mucous membrane, especially on the nasal septum, turbinated bones, larynx and trachea.

*Pulmonary lesions.* In the majority of cases, the lungs are the seat of disease, the lesions consisting of tubercle-like nodules embedded in the lungs. When incised the nodules show a necrotic yellowish centre containing pus. Frequently there are definite glanderous pneumonic areas in the lung with suppurating foci discharging into the bronchial tubes.

*Lymphatic lesions.* The lymph glands adjacent to and draining the glanders foci are invariably swollen and indurated. The sub-maxillary lymph gland is frequently found to be enlarged and indurated. While it seldom forms an abscess, nevertheless it may on cross-section be found to contain a small amount of caseous, pus-like material. The bronchial and inguinal glands may be similarly affected.

*Other lesions.* Lesions may be found occasionally in some of the other organs of the body, namely the liver, spleen and kidney.

#### DIFFERENTIAL DIAGNOSIS

Glanders may be differentiated from other diseases which are characterized clinically by nasal discharge and ulceration of the legs, namely:

*Caries teeth with pus in the facial sinuses.* In these cases the nasal discharge is quite profuse, more so than in glanders, and has an offensive odour. The nasal discharge in glanders has very little odour. The mallein test can be applied where the diagnosis is doubtful.

*Strangles.* This is essentially an acute febrile respiratory disease of young horses characterized by profuse nasal discharge from both nostrils, and by the sudden development of an acute, diffuse, painful suppurative swelling in the inter-maxillary space. This is a benign affection following a definite course, inclining towards recovery in a few weeks' time.

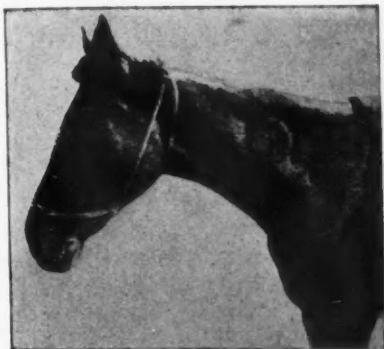
*Purpura Hemorrhagica.* This disease may be clinically distinguished from glanders by the presence of petechiae on the nasal mucous membrane and conjunctiva, together with the characteristic oedematous swellings on the body and legs.

*Lymphangitis.* All forms of lymphangitis accompanied by ulceration of the legs should be differentiated from glanders by means of the mallein test.

#### THE POSITIVE DIAGNOSIS OF GLANDERS

While glanders may be diagnosed in some cases by the presence of clinical symptoms, the use of the mallein test is necessary for the detection of latent

infection and as an aid in the diagnosis of doubtful or suspected cases. There are three recognized methods of applying the mallein test:



**SUBCUTANEOUS MALLEIN TEST**  
Typical reactionary swelling at site of injection.



**OPHTHALMIC MALLEIN TEST**  
Muco-purulent discharge from the eye.

*The Subcutaneous Mallein Test.*

In the application of this test,  $2\frac{1}{2}$  cc. of dilute mallein is injected subcutaneously into the flat surface of the neck. Temperatures are taken before and after the injection of the mallein. This test produces in the glandered horse a definite thermal reaction and a distinct, painful, reactionary swelling at the point of injection, in from eight to twelve hours.

*The Ophthalmic Mallein Test.*

In the application of this test the mallein, either in liquid form or tablet form, is placed in the fornix of the eye. A positive reaction to this test is manifested by the development of a purulent conjunctivitis in the treated eye in from six to twelve hours.

*The Intrapalpebral Mallein Test.*

In the application of this test the mallein is injected intradermally into the loose fold of skin below the margin of the lower eyelid. A positive reaction to this test is manifested by marked swelling of the eyelid accompanied in some cases by a mucopurulent secretion from the eye. The reaction becomes manifest in from twenty-four to forty-eight hours.

**THE CONTROL AND ERADICATION OF  
GLANDERS**

The treatment of glanders in the horse is not permitted in Canada. The Contagious Diseases of Animals Act requires compulsory notification and immediate slaughter of horses shown by the mallein test to be affected. All reactors to the test must be immediately slaughtered and their carcasses properly buried or cremated, followed by the satisfactory cleaning and disinfection of the stables and yards occupied by the affected animals. Contact horses on the same premises which do not react to the

initial test are held under quarantine pending a retest in two or three weeks. Any additional reactors discovered are likewise required to be slaughtered. Other



**PALPEBRAL INTRADERMIC MALLEIN TEST**  
Reactionary oedema of the eyelids and  
profuse lachrymation.

contact or exposed horses must be traced and tested to prevent new outbreaks. Under this policy of compulsory notification, test and slaughter, glanders has been completely controlled and eradicated in Canada, Great Britain and the United States. In some parts of Europe, Asia and Africa, where the disease has not been so dealt with, it still prevails to a considerable extent, and during and following the present war an increase in the prevalence of glanders is likely.

Comprehensive suppression and eradication of glanders were undertaken in Manitoba during the month of February, 1905. The disease appeared to be on the increase in that province and by an arrangement entered into between the Government of Manitoba and the Dominion Government, it was

decided to adopt radical measures under the regulations relating to glanders, requiring compulsory notification and slaughter of reactors to the mallein test.

From 1901 to 1904 only clinical cases were dealt with in Manitoba and the mallein test was not used to detect latent cases.

On clinical symptoms only, 60 horses were destroyed in	1901
" " " " 50 " " " "	1902
" " " " 40 " " " "	1903
" " " " 160 " " " "	1904

During 1905, compulsory notification and slaughter of reactors to the mallein test was instituted. This policy required the slaughter of both clinical and non-clinical cases. The results are shown below:

Year	Horses Tested	Reactors Destroyed	Compensation Paid
1905	1,777	871	\$ 60,053.27
1906	1,493	336	27,207.37
1907	3,065	199	17,303.11
1908	1,319	124	9,304.91
1909	813	70	5,391.27
1910	380	19	1,536.66
1911	930	38	3,389.98
1912	993	24	2,030.00
1913	247	20	1,780.00
1914	733	45	5,313.33
1915	177	4	443.33
1916	37	Nil	Nil
Totals.....	11,874	1,750	\$133,753.23

*Note.*—In addition to the horses shown above 22,481 horses and mules entering from the United States were mallein tested.

In subsequent years only a few individual or sporadic cases were detected in horses entering Manitoba, so that the disease was almost completely eradicated in 1916.

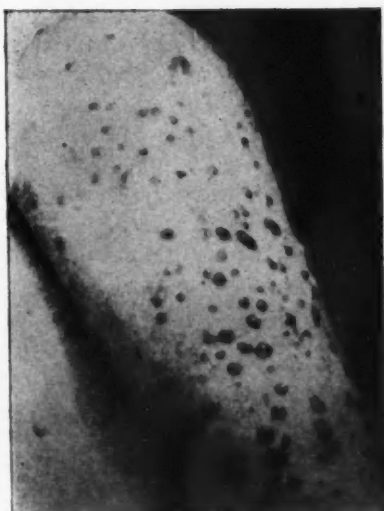
The suppression and eradication of glanders in the horse has been responsible for the disappearance of glanders in man.

#### GLANDERS IN MAN

While glanders as a disease of the horse was comprehensively referred to as early as 425 B.C., no definite recognition of it as a disease transmissible from horse to man was recorded until the early part of the nineteenth century—the Travers' case, reported in 1830, relates to a veterinary student who became infected while dissecting a glandered donkey in London. From that time cases of glanders in man attracted more attention, and many cases have since been recorded in medical and veterinary journals.



GLANDERS IN MAN  
Pustules on skin of face and arms.



GLANDERS IN MAN  
Pustules on skin of the arm.

William Hunting, F.R.C.V.S., Chief Veterinary Inspector to the London County Council, published in 1908 a clinical treatise on glanders. Hunting's monograph is without doubt a classic on the subject of glanders in the horse, and he also describes ten cases of glanders in man which occurred between the years 1903 and 1905.

The most comprehensive analysis of cases of glanders in man is recorded in a monograph on the subject published in May, 1906, by G. D. Robins, M.D., of the Royal Victoria Hospital, Montreal. In his treatise, "A Study of Chronic Glanders in Man", Robins made an analysis of 156 cases collected from the literature available at that time, and in 1907 he described ten cases occurring in Canada. Of these cases, I personally diagnosed and reported two in the Province of Manitoba, one case in 1905 and the other in 1906.

#### THE FRASER CASE, SELKIRK, MANITOBA

This case came under observation during August, 1905. Fraser was 22 years of age and was employed at office work in Winnipeg. About the middle

of August he went on a short visit to a farm near Selkirk. While there, he helped with the farm work and was assigned a team of horses to work and look after. One of the team was a grey mare which had recently been obtained from a horse dealer. This mare had a nasal discharge and on August 20th Fraser made an examination of the mare to determine the cause of the discharge. Two days later he complained of illness, and thereafter the course and progress of the disease could be definitely traced.

*The incubation* was of two days' duration as Fraser unquestionably became infected on August 20th, and on August 22nd he complained of feeling sick (vomiting).

*The prodromal period* began on August 22nd when he first complained of illness. On the following day his appetite became definitely impaired and during the next three days he complained of pains involving the loins and hips. Nausea also increased.

*Pronounced illness* began on August 26th. He refused all food and complained of severe pain in the joints of his arms and legs. His joints became acutely inflamed and swollen, indicating involvement of the articulations and synovial membranes. On this date a physician (Dr. Ross of Selkirk) diagnosed the case as probable typhoid as there were no definite symptoms characteristic of glanders present at that time.

*Nodular eruptions.* On September 3rd, fourteen days after the time of infection, the first clinical objective symptom appeared as a large nodule or pimple on the forehead which was extremely painful to the touch. Two days later nodules were rapidly increasing in numbers and size and appeared simultaneously on the chest, arms, and legs. The pain and swelling of the joints also became more acute. At this time I found glanders among the horses belonging to the dealer who had sold the grey mare. On locating this mare on Fraser's premises, I found her to be a clinical case of glanders and that she reacted to the mallein test. Hearing of the young man's illness and seeing him, I mentioned the possibility of his having contracted glanders and suggested a medical consultation. Dr. Grain of Selkirk was called by Dr. Ross, and a diagnosis of glanders was made. Some of the pus material was subsequently submitted to Dr. Gordon Bell, Provincial Bacteriologist, and he confirmed the clinical diagnosis.

*Pustular period and ulcerative stage.* On September 6th the nodules were developing into pustules and ulcers. The nostrils became ulcerated and discharged a bloody, purulent material. Ulcers also appeared on the eyelids and lips. The patient then sank rapidly and succumbed to the disease on September 8th, literally covered with pustules and ulcers.

*Comment.* The period of incubation was definitely established as two days. The disease became manifest by nausea and typhoid-like symptoms, lasting from ten to twelve days, followed by a period of nodular and pustular eruption, nasal ulceration and discharge covering a period of five days. The course and duration of the disease covered a period of nineteen days from the time of infection.



## THE HALL CASE, DARLINGFORD, MANITOBA

This case came under observation on May 12, 1906. Hall, a farmer, had been treating his own horses for several weeks for a nasal discharge which he supposed to be distemper. Hall began to feel sick on May 5th, but continued to attend to his farm work until May 8th, when he complained of severe pain in the joints and muscles of his arms and legs. His physician, Dr. J. D. Stewart of Darlingford, was called in, and from the symptoms naturally thought the patient to be suffering from an attack of inflammatory rheumatism. On May 12th I happened to be in that district tracing some suspected cases of glanders, and incidentally visited Hall's premises to examine his horses. I found several of them to be showing definite clinical symptoms of glanders and confirmed the diagnosis by the mallein test. On visiting the house to inform the owner regarding his horses, I found him in bed suffering from severe pains in the axilla and in his joints, particularly the knees and hips. On examination I noticed that his face showed marked icterus, with darkish-coloured areas under the eyelids. He also had a painful nodule on the forehead and a painful, swollen, tense, shiny area of cellulitis about the size of one's hand on the calf of the right leg and a similar area of inflammation on the upper part of the left arm. I diagnosed the case as likely glanders and immediately reported my suspicions to Dr. Stewart. At his request, I visited the patient with him. We found the patient restless and feverish with a temperature of 103.6 F. and pulse 100. On the following day, May 13th, the patient's condition was only slightly changed, and he remained in much the same condition until May 16th. On that day his temperature was higher, and his pulse irregular. The area of cellulitis on the leg and arm had increased in size. The nodule on the forehead had developed into a pustule. An ulcer had also developed on the face, another on the left shoulder and also one on the left thigh. Dr. Stewart then definitely confirmed the diagnosis of glanders infection and called the district health officer, Dr. Speechly of Pilot Mound, in consultation. From the facts of the case he agreed with the diagnosis and submitted material for laboratory diagnosis to Dr. Gordon Bell, Provincial Bacteriologist. His findings confirmed the clinical diagnosis. On May 17th, the patient became much worse. He was in agony from pains in his joints and muscles and greatly depressed. Numerous small lesions had developed on the shoulders, back and thighs. The lesions showed all stages of development from reddened nodules to pustules and ulcers. On May 19th the patient became literally covered with suppurating sores, and he died the following day.

*Comment.* The exact period of incubation could not be established. The disease at the onset was characterized by general illness and manifestations of inflammatory rheumatism. This was followed by areas of cellulitis on the arms and legs, marked icterus of the face, and subsequently during the later stages by the rapid development of nodules, pustules, and ulcers over the surface of the body. The duration and course of the disease covered a period of approximately fifteen days.

# The Rapidity of Antitoxin Response to a Recall Dose of Diphtheria Toxoid

F. O. WISHART, M.A., M.D., D.P.H., G. G. WATERS, B.A.,  
C. M. HORNER, B.A., M.D., D.P.H.

*Department of Hygiene and Preventive Medicine  
School of Hygiene, University of Toronto*

THE primary purpose of this study was to determine the earliest time, in days, at which an increase in antitoxin becomes apparent following a recall dose of toxoid. By extending the period of observation additional information of interest was obtained.

This experiment was suggested by the occurrence of diphtheria in previously toxoided individuals as reported on several occasions (1) (2). Such apparent failures of active immunization are not surprising in view of the accumulated evidence regarding the rate of decrease in antitoxin level over a period of years following the primary course of toxoid injections (3) (4) or, indeed, following the natural disease itself. This is not the only explanation for such reported failures, for in most large-scale immunization programs the status of immunity following toxoid administration is not determined, and a small percentage of individuals may have produced less than adequate amounts of antitoxin. This percentage may become appreciable when an inferior antigen is used, the amount given is too small, or the interval between doses is too short. Such considerations serve to emphasize the importance of the recall dose and when diphtheria breaks out in a community its use is imperative (5). There is, however, a special circumstance which presents a problem and that is, when previously toxoided individuals have a definite exposure to clinical diphtheria. The question has arisen as to the efficacy of giving a recall dose of toxoid to such individuals at the earliest possible moment following exposure. Something similar to this is done in certain armed forces in the prophylaxis of tetanus; i.e., individuals who are wounded and have previously received tetanus toxoid are given a recall dose as soon as possible after the infliction of the wound. In diphtheria, where the incubation period is short, the prophylactic value of an immediate recall dose of toxoid would presumably depend on a very rapid response in antitoxin production.

## EXPERIMENTAL

Twelve young adults were selected who had had a course of toxoid injections previously. Blood was drawn from each and the antitoxin titre of the serum determined by the method of Fraser (6). Immediately following the withdrawal of blood, 0.1 cc. of fluid toxoid (16 Lf. per cc.) was given subcutaneously. Blood was subsequently drawn for antitoxin titrations at 2, 3, 4, 5, 6, 7, 11 and 19 days, and at 5, 12 and 24 months, as shown in the table.

## DIPHTHERIA ANTITOXIN TITRATIONS BEFORE AND AFTER REINFORCING DOSE OF TOXOID

TIME INTERVALS AND TITRES IN UNITS PER CC. OF SERUM														
Name	DAYS										MONTHS			
	0	2	3	4	5	6	7	11	19	5	12	24	Reactions	
J.F....	$\geq 1/50$ $< 1/10$	$1/50$	$1/50$	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$\geq 1/10$ $< 1$	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	1	$\geq 1/10$ $< 1$	Moderate local	
F.F....	$1/50$	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$1/10$	$\geq 1/10$ $< 1$	$> 1 < 5$	$> 1 < 5$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	Moderate local	
G.G....	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$> 1 < 5$	$\geq 10$ $< 20$	20	$< 10$	$> 5 < 10$	$> 1 < 5$	....	Nil	
G.H....	$\geq 1/10$ $< 1$	1	1	1	5	$> 40$	$\geq 20$ $< 40$	160	$\geq 80$ $< 160$	80	40	....	Very severe local and general	
C.H....	$\geq 1/100$ $< 1/50$	$\geq 1/100$ $< 1/50$	$\geq 1/100$ $< 1/50$	$\geq 1/50$ $< 1/10$	$1/10$	$> 1 < 5$	5	5	$> 1 < 5$	$> 1 < 5$	$\geq 1/10$ $< 1$	....	Moderate local	
L.M....	$1/100$	$< 1/100$	$< 1/100$	$< 1/100$	$\geq 1/100$ $< 1/50$	$\geq 1/50$ $< 1/10$	$\geq 1/10$ $< 1$	$> 1 < 5$	$> 1 < 5$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	Moderate local Slight general	
H.M....	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$1/10$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	Slight local	
G.M....	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$> 1 < 5$	10	20	40	$> 20 < 40$	$> 5 < 10$	5	$\geq 1$ $< 5$	Moderate local and general	
C.S....	$1/10$	$\geq 1/50$ $< 1/10$	$\geq 1/50$ $< 1/10$	$\geq 1/10$ $< 1$	$\geq 1/50$ $< 1/10$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	$\geq 1$ $< 5$	Nil	
G.W....	$1/10$	$1/10$	$1/10$	$\geq 1/10$ $< 1$	$\geq 1/50$ $< 1/10$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	1	$> 1 < 5$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	Nil	
F.W....	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	$< 1/10$	$\geq 1/10$ $< 1$	1	$> 1 < 5$	$> 1 < 5$	$> 1 < 5$	$\geq 1/10$ $< 1$	$\geq 1/10$ $< 1$	Slight local	
G.Mc...	$\geq 1/100$ $< 1/50$	$\geq 1/50$ $< 1/10$	$1/10$	$\geq 1/10$ $< 1$	$\geq 1/50$ $< 1/10$	$\geq 1/10$ $< 1$	5	$> 40$	$> 40$	40	$> 20 < 40$	....	Moderate local and general	

It is necessary in analysing the results set forth in the table to keep in mind the limits of accuracy inherent in the biological test employed in the antitoxin titrations. In the case of J.F., L.M., and C.S., there is a suggestion of a "negative phase" or reduction in titre in the days immediately following the administration of toxoid. However, this is probably more apparent than real, for others—e.g., G.W., C.S., and F.W.—manifest a similar variation as late as the 5th day. On the other hand, F.F., G.H., and G.Mc. could be said to show an increase by the 2nd day but once again this is due to unavoidable variation in the test as is shown by following the titrations, for these individuals, for several days. Unfortunately the early serial bleedings from the same individuals were not titrated at the same time and on one animal. With these reservations and accepting only as a real increase a definite shift from one bracket to the next, the table reveals an increase in antitoxin as follows: 2nd and 3rd days, none; 4th day, 2 or 16.6 per cent; 5th day, 4 or 33.3 per cent; 6th day, 10 or 83.3 per cent; 7th day, 12 or 100 per cent.

Within the limits imposed by the intervals used, the maximum increase in titre was reached as follows: 6th day, 1; 7th day, 1; 11th day, 9, and 19th day, 1. In 92 per cent, then, the maximum titre was reached by the 11th day.

Some variation is evident in the maintenance of the antitoxin level. In certain cases there is a suggestion of a decrease as early as the 19th day, i.e. approximately a week after the peak was attained. This would appear to be definite in one case only, G.G. At the end of 5 months, 4 are still at their maximum, 6 have definitely fallen off and in 2 the change is uncertain. At the end of 1 year, however, all show a reduction from the peak. In one individual, F.W., the titre has returned to the value shown before the re-inforcing dose was given. Of the 8 persons available for test at the end of 2 years, 6 have the same titre as at the end of 1 year while 2 show a slight decrease. All but one of the 8 still have higher titres than at the beginning of the experiment.

A relationship appears to exist between the severity of the reaction experienced, as shown in general terms in the table, and the increase in antitoxin. Of interest, in any case, is G.H., who was ill for 2 or 3 days with a severe local and general reaction and whose titre reached the phenomenal level for a human of 160 units of antitoxin. Those next in order of severity of reaction, G.M., L.M., and G.Mc., also had outstanding increases in their antitoxin level while those with slight or no reaction had minor increases. No correlation is discernible between the antitoxin level before inoculation and the rapidity or degree of antitoxin response. The numbers are too small, however, to warrant any general conclusions on these points.

#### DISCUSSION

The results recorded here are in general agreement with the findings of others who have reported on somewhat similar experiments. Thus Volk and Bunney (5), who gave recall doses of diphtheria toxoid to a group of children and then drew blood on the 5th and 10th days, found that 74 per cent showed

an increase by the 5th day and 97 per cent by the 10th day. According to Cowles (7) the injection of tetanus toxoid into actively immune humans gives rise to a significant increase in antitoxin on the 4th or 5th day. Robertson and Keppie (8), using stimulating doses of *Cl. welchii* toxoid in previously immunized rabbits, found that the increase in antitoxin titre was not detectable until the 3rd day and not very substantial until the 5th day. Hartley and Evans (9) report that 30 per cent of a group of guinea pigs given a recall dose of tetanus toxoid showed an antitoxin increase by the 5th day and 100 per cent by the 10th day. Zuger and co-workers (10) (11) found that in immunized guinea pigs receiving tetanus toxin or tetanus toxoid and spores simultaneously, a significant rise in antitoxin occurred on the 4th to 5th day, but that when spores only were injected the rise did not occur until the 7th to 10th day. Also of interest was their finding that of 75 immunized guinea pigs given toxoid and spores at the same time, 8 developed local tetanus while of a second group of 75 receiving spores only, 13 developed local and 4 generalized tetanus. Since the earliest detectable rise in antitoxin titre as determined by our study was the 4th day (16.6 per cent of individuals) it would appear that a reinforcing injection of toxoid at the time of exposure would be unlikely to prevent the development of diphtheria. It would quite possibly result in a mild attack. Had the dose of toxoid given been larger, or again, had the group studied possessed less antitoxin prior to injection, a somewhat different result might have been obtained, but it is unlikely that any such variation would have altered these findings significantly. Thus Fraser and co-workers (12), in regard to tetanus, report that the higher the level of antitoxin in humans at the time of the recall dose, the greater the antitoxin response; and Zuger (10) states that a relationship between the rise in antitoxin titre in guinea pigs and the original level was not apparent in his experiments.

#### SUMMARY

A group of 12 individuals was given a recall dose of diphtheria toxoid and the antitoxin levels followed for a period of 2 years. The earliest definite increase in antitoxin was on the 4th day following inoculation in 16.6 per cent of individuals. By the 7th day, 100 per cent had responded.

The maximum titre was attained by the majority by the 11th day.

A direct correlation appeared to obtain between the degree of reaction experienced following the toxoid injection and the amount of antitoxin produced.

#### CONCLUSION

In diphtheria where the incubation period is short, 2 to 5 days, the administration of a reinforcing dose of toxoid after exposure would be unlikely to avert the disease.

## REFERENCES

- (1) Glover, B. T. J., and Wright, H. D., *Lancet*, 1942, 2:133.
- (2) Neubauer, C., *Lancet*, 1943, 2:192.
- (3) Fraser, D. T., *Canad. Pub. Health J.*, 1939, 30:469.
- (4) Volk, Vladimir K., and Bunney, William Edward, *Am. J. Pub. Health*, 1942, 32:700.
- (5) Idem, *Am. J. Pub. Health*, 1943, 33:475.
- (6) Fraser, D. T., *Trans. Roy. Soc. Canada*, 1931, 25, Ser. V:175.
- (7) Cowles, Philip B., *Yale J. Biol. & Med.*, 1936-37, 9:409.
- (8) Robertson, M., and Keppie, J., *Lancet*, 1943, 2:311.
- (9) Hartley, Percival, Evans, D. G. and Hartley, Olga M., *Lancet*, 1943, 2:314.
- (10) Zuger, Bernard, Greenwald, Charles K., and Gerber, Herman, *J. Immunol.*, 1940, 38:431.
- (11) Idem, *J. Immunol.*, 1942, 44:309.
- (12) Fraser, D. T., MacLean, D. L., Orr, M. D., Plummer, H. C., and Wishart, F. O., *Am. J. Pub. Health*, 1943, 33:1107.

## An Accelerated Certificate-Course in Public Health Nursing

FROM centres throughout the Province of Ontario, requests for public health nursing personnel are being received and there are definite indications that expansion in the public health field will continue in the immediate future. The number of public health nurses available is inadequate to meet the present situation, much less to provide for the proposed developments.

Officials of the Department of Health and members of the nursing faculties of the University of Toronto and the University of Western Ontario have considered the situation and have agreed upon a plan of action. The plan provides for an Accelerated Certificate Course in Public Health Nursing, to be offered at each of the universities. The course will include the work ordinarily covered in the one-year Certificate Course for graduate nurses but the time will be accelerated. At each university the course will begin on August 30th and the theoretical term will end on February 20th. Supervised field practice will follow for a period of two months.

Under the plan, the Ontario Depart-

ment of Health offers to nurses who meet certain requirements and who are willing to commit themselves to accepting employment for a period of one year following their field practice under the direction of the Department, salary at the rate of \$1400 a year beginning February 20th. At the opening of the course, \$100 will be given towards the tuition fee; at the end of the year of service the nurses will be reimbursed for the remaining portion of the fee, the total sum not to exceed two hundred dollars.

Nurses who wish to participate in this plan should apply at once to the university of their choice. It is necessary that the requirements for admission to the course be cleared before consideration can be given to the other factors. It is hoped that nurses from all sections of the province will respond to the challenge of the need and the opportunity offered by the plan. Application forms are available from the Division of Public Health Nursing, Department of Health, Parliament Buildings, Toronto 2.



# Transmission of Salmonella Pullorum by Flies

RONALD GWATKIN AND CHAS. A. MITCHELL

*Division of Animal Pathology, Science Service  
Dominion Department of Agriculture*

WHILE experiments on the transmission of *S. pullorum* by flies have little direct bearing on public health, they are of interest in their possible application to other members of the *Salmonella* group. Reports of human infection are rare. Edwards and Bruner (1) report the occurrence of *S. pullorum* in two people. One had a mild gastro-enteritis while the history of the other was unknown. Borman *et al* (2) refer to the recovery of the organism from one person. We have been unable to find any references to experiments on fly-borne infection with *S. pullorum* in chicks. The work was commenced too late in the year to carry out all the experiments that had been planned but sufficient has been done to indicate the possible role of flies in the transmission of this infection.

The chicks used in these experiments were hatched from eggs obtained from a flock which had been free from pullorum disease for years. The flies were the common house fly, *Musca domestica*. The cultures of *S. pullorum* were recently isolated and were obtained from the Poultry Pathology Laboratory, Ottawa.

## EXPERIMENT 1

A cage was constructed of wood and factory cotton and divided in the middle so that the chicks remained at one end while the flies had access to both ends. Several hundred flies were caught and transferred to this cage on July 28th. Four slants of *S. pullorum* were washed off in 20 cc. of water. Beef-extract agar was used so that the resulting suspension was very light. This was mixed with some chick starter and a few drops of blood to make it attractive to the flies. It was left in the cage for four hours. It was then removed and twelve chicks about fifty-six hours old were put in the other end of the cage and given some chick starter mixed with water. The flies soon moved to this end of the cage and commenced feeding on the clean material. No heat was supplied to the chicks other than a bottle of hot water the first night, which did not retain its heat for very long.

The following day some of the flies had escaped and they were replaced with a freshly caught lot. Infected feed was prepared as before and given to the flies at their end of the cage, during which time the feed at the chick end was removed. After one hour, the infected feed was removed and the chick feed replaced at the other end.

On July 30th, the pulped organs of two chicks which had died following

---

*Presented at the twelfth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, held in the Royal York Hotel, Toronto, on December 15 and 16, 1943.*

artificial infection were put in the fly end of the cage for one hour and this was repeated with the organs of two more chicks on July 31st.

One chick died on August 1st, four on August 2nd, four on August 3rd, and one on August 4th. On August 7th, the two survivors still appeared healthy. They were killed and, as in the case of the others, cultures were made on blood-agar plates from the heart, lung and liver. A heavy growth of *S. pullorum* was recovered from nine of the ten that died. Culture of the tenth chick was overgrown with colon-like organisms and, if present, *S. pullorum* was masked by the former. A few colonies of the organism were recovered from the two chicks which were killed on August 7th.

In this experiment, ten of twelve chicks died from infection carried by flies which had fed on cultures and infected chicks. The two surviving chicks harboured infection. The possibility of the chicks having eaten some of the flies could not be excluded.

#### EXPERIMENT 2

The same cage employed in Experiment 1 was cleaned and disinfected. The centre partition was reconstructed so that the flies could be kept at their own end of the cage when the chicks were present.

On August 11th, flies were allowed to feed for two hours on chick starter infected with culture recovered from a chick in Experiment 1. They were then driven to the chicks' end of the cage and allowed to feed on clean feed moistened with water. After two hours they were driven back to their own end of the cage and six chicks about fifty-four hours old were put in the end which the flies had been allowed to contaminate. Some of the flies succeeded in gaining entrance to the chick compartment so that again the possibility of the chicks having eaten flies could not be excluded.

One chick was dead the following day, probably as a result of chilling, and only a few coccus colonies developed on culture. The second chick died on August 14th and culture from this was overgrown with *Proteus*. The remaining four died on August 16th. *S. pullorum* was recovered from three while the fourth culture was overgrown.

In this experiment chicks died of pullorum disease as a result of exposure to flies which had fed on material infected with culture only, but again the question of eating flies could not be excluded.

#### EXPERIMENT 3

About one hundred flies were collected on August 20th. They were given chick starter moistened with a suspension of several strains of *S. pullorum*. Two and one-half hours later they were allowed access to clean feed for the same length of time. They were then removed to another cage and the following morning were again allowed to feed on clean chick mash for two and a half hours. At the end of this period, the feed which had been exposed the previous day was fed to twenty-seven chicks (Lot A) and that which had just been exposed was

fed to the same number of chicks in lot B. The chicks were about forty-eight hours old. No brooder heat was supplied.

On the morning of August 23rd, thirteen chicks in group A and fifteen in group B were dead. There were no marked pathological changes other than an oedematous condition of the tissues. Four more in group A and five in group B were dead by evening and showed congestion of the lungs in addition to the oedema. They continued to die until August 30th, at which time there was one survivor in each group. These were killed and cultured. None of these chicks yielded *S. pullorum*.

In this experiment the chicks died as the result of chilling but, in spite of this predisposing factor, none yielded *S. pullorum* on culture. Two flies from among those which had been used for infecting the feed yielded the organism on culture.

#### EXPERIMENT 4

A brooder was made by the use of a 40-watt bulb under a metal hood. On August 27th, flies were allowed to feed on chick mash moistened with a suspension of the growth from two blood-agar plates. After a period of two hours clean feed was substituted for the same length of time. The flies were then removed and twenty-one chicks about fifty-six hours old were put in the cage. The chicks appeared comfortable under the hover. One died the following day, one on September 8th. The others remained healthy. Cultures of the three chicks did not yield *S. pullorum*.

#### EXPERIMENT 5

On September 10th, two cages were equipped with brooders. Chick mash was mixed with a suspension of the growth from two blood-agar plates. Flies were allowed to feed on this for one and a half hours and it was then replaced with clean chick mash on which the flies continued to feed for the same length of time.

Lot A consisted of six chicks about forty-eight hours old and twenty-five day-old chicks. These were given the exposed chick mash. Between 150 and 200 flies were used.

Lot B consisted of six chicks forty-eight hours old and twenty-four day-old chicks from the same batch. They were given clean feed on which fifty of the exposed flies had been killed and dropped. It is not known how many flies had actually fed on the infected material but it is certain that some of them had done so.

One chick from lot A died on September 13th. It was a weak chick and culture was negative. The others all appeared well on September 14th. Ten were taken from each group and left in cardboard boxes without heat until the following morning, at which time they were again placed in the brooder cages.

During the fifteen days the chicks were under observation, six died in group A and *S. pullorum* was recovered from two. Four of the deaths and both

isolations were in the chilled group. Five died in group B and *S. pullorum* was recovered from three. Three of the deaths and two recoveries of the organism were in the non-chilled group. Ten chicks from each of groups A and B were killed and cultured. The organism was recovered from one A and one B, both in the chilled groups.

While the number is admittedly small, some chicks certainly died as a result of eating feed infected by flies. This feed was the only known source of infection in group A. In group B, the small number of chicks infected by eating flies may, we believe, be accounted for by loss of virulence in our cultures, and the same factor would explain the results in group A and in experiment 4.

#### EXPERIMENT 6

On September 14th, flies were allowed to feed on chick mash moistened with culture suspension, which was left in the cage until the following day. On September 14th, the cage was put in the cold room to facilitate collection of the flies. Four chicks about forty-eight hours old were fed six flies each, four received four and four were given two flies each. Three of these chicks died but cultures from liver, heart and lungs did not yield *S. pullorum*.

#### EXPERIMENT 7

One blood-agar slant of culture used in Experiment 6 was washed off with 3.0 cc. of saline and three chicks were fed 1.0 cc. each. The chicks remained in good health. A subculture made from this one was washed off with 1.5 cc. of saline and three chicks were injected with 0.5 cc. each by the subcutaneous route. These birds were not affected by the injections. It would appear, therefore, that the virulence was so lowered as to account for the results in the last few experiments. Dead chicks as well as culture were used in the first experiment and while culture only was used in the second it was a direct isolation from a chick, whereas the organism had been further subcultured before being employed in the later experiments.

#### EXPERIMENT 8

The feet and wings of four flies cultured immediately after exposure yielded *S. pullorum*. Intestinal tracts of two of these were cultured, with recovery of the organism from one. The other culture was overgrown. Four flies were kept in a jar for six hours, at which time the feet and wings were cultured. *S. pullorum* was recovered from one. A group of flies that had been exposed to infection was held for five days and each day two were dipped in hypochlorous acid, washed with alcohol, and the gastro-intestinal tract removed and cultured. In some cases the cultures were so overgrown that organisms could not be identified but *S. pullorum* was found in some samples up to the fifth day. No information was obtained from a quantitative angle but it is certain that some of these organisms may survive in the fly for five days.

## SUMMARY

In the first two experiments, chicks died from pullorum disease following access to feed contaminated by infected flies and to the flies themselves, some of which were probably eaten by the chicks.

In the third and fourth experiments, *S. pullorum* was not recovered from any of the chicks which had been given feed to which infected flies had had access. The chicks in Experiment 3 died as the result of having been chilled.

In the fifth experiment, however, the disease was produced in a small number of chicks by feeding chick mash which had been contaminated by infected flies. Some of the infected flies themselves were fed to another group of chicks and the organism was also recovered from a small proportion.

Subsequent failure to infect chicks by feeding or injecting relatively large amounts of culture suggests that the small number infected in the later experiments was probably due to lowered virulence of the infective agent.

Virulence of the infective agent would be better assured for this type of experiment by using organisms taken direct from chicks dead of the disease instead of cultures of the organism.

*S. pullorum* was recovered from the feet and wings of flies immediately after exposure and six hours later. It was recovered from the gastro-intestinal tract up to five days, beyond which time examinations were not made.

## REFERENCES

1. Edwards, P. R., and Bruner, D. W., J. Inf. Dis., 1943, 72: 58-67.
2. Borman, E. K., Wheeler, K. M., West, D. E., and Mickle, F. L., Am. J. Pub. Health, 1943, 33: 127-134.

# Errors in the Calculation of the Nutritive Value of Food Intake

## IV. Comparison of Calculated and Determined Amounts of Calcium

E. M. SEMMONS AND E. W. MCHENRY

*School of Hygiene, University of Toronto*

IN the first papers in this series (1, 2, 3,) differences between calculated and analytically determined values for calories, fat, protein, ascorbic acid, and iron of actual meals were reported. These investigations have been part of a general study on sources and magnitude of error likely to occur in dietary surveys. In this report a comparison between calculated and actual values for calcium is given.

### PROCEDURE

As in previous reports a series of twenty-one meals, as served in the cafeteria of the Connaught Laboratories, was used. This number was chosen because most dietary surveys which have been made in Canada have been carried out for a period of one week with twenty-one meals. The meals used for analysis were all different and included such a variety of food that they might be considered to resemble in composition a series of meals which might be encountered in a survey. The menus for the separate meals were as follows:

#### *Meal No. 1*

Vegetable soup, corned beef, boiled cabbage, cabbage, carrot and celery salad, pickle, celery sticks, brown bread and butter, applesauce and cereal cream, milk.

#### *Meal No. 2*

Cream of carrot soup, cold roast beef, mashed turnip, pickle, red cabbage salad, brown bread and butter, spice cake with chocolate sauce, milk.

#### *Meal No. 3*

Cream of carrot soup, baked fillet of pickerel, mashed turnip, red cabbage salad, Canada Approved white bread and butter, fresh apple, milk.

#### *Meal No. 4*

Cream of pea soup, roast beef and gravy, mashed squash, head lettuce and carrot sticks, green celery stuffed with cheese, brown bread and butter, baked cottage pudding with butter-scotch sauce, milk.

#### *Meal No. 5*

Cream of potato soup, baked salmon, spinach, pickled beets, head lettuce, cottage cheese, Canada Approved white bread and butter, apple Betty and cereal cream, milk.

#### *Meal No. 6*

Vegetable soup, baked meat loaf and gravy, cauliflower, cole slaw and celery sticks, Canada Approved white bread and butter, vanilla ice cream.

#### *Meal No. 7*

Vegetable soup, fried sausage, mashed potato, cabbage, lettuce, carrot, spinach and celery salad, brown bread and butter, vanilla cornstarch pudding and canned pineapple, milk.

*Meal No. 8*

Cream of spinach soup, macaroni and cheese, carrot, cabbage, peas, beans and cheese salad, head lettuce, brown bread and butter, applesauce and cereal cream, milk.

*Meal No. 9*

Cream of carrot soup, roast beef and gravy, baked potato, cole slaw, brown bread and butter, caramel cornstarch pudding.

*Meal No. 10*

Cream of green pea soup, creamed salmon, tea biscuits, mixed vegetable salad, Canadian cheddar cheese, Canada Approved white bread and butter, applesauce and cereal cream.

*Meal No. 11*

Barley broth, beef stew with carrot, turnip and potato, Waldorf salad, head lettuce, Canada Approved white bread and butter, chocolate cake with lemon sauce.

*Meal No. 12*

Vegetable soup, baked ham, diced beets, macaroni and celery salad, carrot sticks, Canadian cheddar cheese, brown bread and butter, grapes, milk.

*Meal No. 13*

Split pea soup, cold ham, mashed turnips, cabbage, carrot and raisin salad, brown bread and butter, vanilla ice cream, cereal cream (coffee), milk.

*Meal No. 14*

Cream of potato soup, roast beef, boiled cabbage, head lettuce, Waldorf salad, brown bread and butter, gingerbread and vanilla sauce, milk.

*Meal No. 15*

Cream of green pea soup, salmon and celery salad, mayonnaise, creamed mixed vegetables, Canadian cheddar cheese, Canada Approved white toast, brown bread and butter, stewed apple and custard, milk.

*Meal No. 16*

Broth with rice, cold ham, scalloped potatoes, cole slaw, brown bread and butter, chocolate cornstarch pudding, milk.

*Meal No. 17*

Cream of celery soup, fried sausages, pickled beets, diced carrots and peas, head lettuce and green celery, brown bread and butter, rice custard with raisins, milk.

*Meal No. 18*

Vegetable chowder, cold roast beef, mashed parsnips, green celery stuffed with cheese, Canada Approved white bread and butter, fresh orange, milk.

*Meal No. 19*

Cream of green pea soup, roast beef, boiled cabbage, pickled beets, carrot sticks, brown bread and butter, rice pudding, milk.

*Meal No. 20*

Cream of celery soup, steamed salmon and white sauce, sliced lemon, diced carrots and peas, cole slaw, Canadian cheddar cheese, Canada Approved white bread and butter, applesauce and cereal cream, milk.

*Meal No. 21*

Barley broth, baked meat loaf, creamed celery, carrot, cabbage and celery salad, brown bread and butter, lemon cornstarch pudding and cereal cream, milk.

Calcium determinations were made according to the micro procedure described in the method of analysis of the Association of Official Agricultural Chemists (4). Servings of average size of each food for one meal were weighed and thoroughly mixed in a Waring blender. From the homogenized material



COMPARISON OF CALCIUM CONTENT OF TWENTY-ONE MEALS, DETERMINED BY ANALYSIS AND BY CALCULATION

Meal Number	Calcium Content by analysis mg./100g.	Calcium Calculated from Table 1			Calcium Calculated from Table 2			Calcium Calculated from Table 3		
		mg./100g.	Per cent.	$\frac{\text{anal. val.}}{\text{calc. val.}}$	mg./100g.	Per cent.	$\frac{\text{anal. val.}}{\text{calc. val.}}$	mg./100g.	Per cent.	$\frac{\text{anal. val.}}{\text{calc. val.}}$
1	40.0	47.4		84.0	42.2		94.8	47.2		84.8
2	60.2	69.8		86.2	68.2		88.2	72.0		83.5
3	53.5	62.5		85.6	68.0		78.8	74.0		72.3
4	60.6	61.1		99.3	55.3		103.5	59.0		102.5
5	45.8	78.0		58.8	45.6		100.3	63.6		72.0
6	30.8	48.8		63.2	31.8		97.0	25.0		123.0
7	41.5	37.8		110.0	43.3		96.0	48.6		85.5
8	93.0	77.0		121.0	88.5		105.0	96.2		96.8
9	40.5	40.5		100.0	44.0		92.0	51.0		79.5
10	90.0	92.5		97.5	72.7		124.0	80.7		111.5
11	23.3	20.8		112.0	16.4		142.0	17.8		131.0
12	44.4	67.5		65.8	58.5		75.8	64.5		68.8
13	59.0	79.8		74.0	73.7		80.0	71.8		82.0
14	63.0	70.5		89.5	55.5		114.0	62.6		100.8
15	79.0	84.0		94.0	96.3		82.0	102.0		77.5
16	53.5	68.5		78.2	60.0		89.2	63.6		84.2
17	44.7	63.3		70.8	62.7		71.3	68.7		65.0
18	56.7	75.8		74.8	83.5		67.8	80.0		70.8
19	61.0	67.2		90.8	68.2		89.4	75.2		81.2
20	72.5	89.0		81.5	83.4		87.0	87.7		82.6
21	45.3	58.3		77.7	49.2		92.0	52.7		86.0
				Mean.....			94.1			87.7
				Standard Deviation.....			17.7			17.5
				Probable Error of Mean.....			2.5			2.5

50 gram aliquots were used for analysis. Results were calculated as milligrams of calcium per 100 grams of mixed food.

Calculations of the calcium content of each meal were made using three tables of food composition: (1) the table issued by the Canadian Council on Nutrition in 1939; (2) the table prepared by the Committee on Food Composition of the U.S. Food and Nutrition Board; (3) the table prepared by Pett and Macbeth and issued by the Division of Nutrition Services, Department of Pensions and National Health, January, 1944. Comparisons have been made between the values obtained by the use of these three tables and those secured by analysis. These comparisons are given in the table. Here the three sets of data on food composition which were used are referred to by the numbers used above.

Several observations are apparent from the comparisons between analytically determined values and those calculated from different tables. This report deals with part of a study concerned with the errors liable to occur in nutritional surveys. At least three possible sources of error are evident from the results: (1) the calcium intake may be highly variable from meal to meal and from day to day; (2) there is a difference between actual and calculated values; (3) this difference is not constant for different meals and has been found to vary over a wide range.

The first source of error is a matter of some concern and should be considered in deciding the length of period during which food records will be obtained. A study of the daily and seasonal fluctuations in food intakes is under way in this laboratory and will be reported presently. Aside from this source of error, the third point listed above also has a bearing on the choice of length of time during which food intake records are to be taken. The range of differences between actual and calculated values of calcium content for individual meals is very great. The probable error of the mean of such differences indicates that this particular error is reduced to 7.5 per cent (three times the probable error), if calculations are made for twenty-one meals. Consequently, to secure a reasonably accurate calculation of calcium intake, it is advisable to record food supplies for more than one or two days, and preferably for at least seven days.

While the variability of the differences between actual and calculated values is reduced by using a mean for at least twenty-one meals, there is still an error due to the use of tables of food composition. The extent of this error depends on the table which is employed. With all of the three tables which have been used in the present study the mean of the calculated values has been in excess of the mean of actual contents; the difference is approximately the same for the two Canadian tables, but much less in the case of the U.S. table. From the present results it seems likely that the calcium intakes which have been reported in Canadian dietary surveys have been about 15 per cent too great. It is obvious that the data from dietary surveys are not likely to be comparable unless the same table of food composition is used; this has been pointed out in other reports from this laboratory. This study, and previous ones on this general

subject, indicate that attention should be given to the validity of figures of food composition.

The average calcium content of samples of milk on sale in Toronto has been found to be 100 mg. per 100 grams; the value commonly given in most food tables is 120 mg. The calcium contents of the twenty-one meals have been recalculated using the table of Pett and Macbeth, with the milk value changed to the lower figure. This recalculation gave calcium contents which show the same deviation as formerly but the average percentage of actual values in terms of calculated ones is 96.3 in place of 87.7. Similarly, the contents have been recalculated with the U.S.N.R.C. table, again with a change in the milk value. The average percentage in this case is 99.8. It is obvious that the change in the figure used for the calcium content of milk has brought excellent agreement between actual and calculated values.

#### SUMMARY

The calcium content of twenty-one different meals has been analytically determined and also calculated, using food composition values from three tables. The mean of the actual contents was from 86 to 94 per cent of the contents secured by calculation. Individual meals show a considerable variability in differences between determined and calculated values. The probable error of the mean for twenty-one meals is 2.5, indicating that the use of this number of meals, as in a dietary survey, gives a more reliable estimate of calcium intake than would a few meals. It is likely that the calcium intakes recorded in various Canadian dietary surveys (5) are about 15 per cent too great. A preliminary study on the calcium content of milk, using samples purchased in Toronto, indicates that the actual content is about 20 per cent less than the amount given in the food tables; this may be a factor in causing the discrepancy between actual and calculated values for meals.

This study has been carried out under the auspices of the Committee on Food Analyses of the Canadian Council on Nutrition.

#### REFERENCES

1. Patterson, J. M., and McHenry, E. W.: Calories, protein and fat. *Canad. Pub. Health J.*, 1941, 32: 362.
2. Young, C. M., and McHenry, E. W.: Comparison of calculated and determined amounts of ascorbic acid. *Canad. Pub. Health J.*, 1942, 33: 224.
3. Young, C. M., and McHenry, E. W.: Comparison of calculated and determined amounts of iron. *Canad. J. Pub. Health*, 1943, 34: 367.
4. *Methods of Analysis of the Assoc. Official Agric. Chemists*, Fifth ed., Washington, 1940.
5. McHenry, E. W.: Nutrition in Toronto. *Canad. Pub. Health J.*, 1939, 30: 4.  
Young, E. G.: A dietary study in Halifax. Sylvestre, J. E., and Nadeau, H.: *Enquête sur l'alimentation habituelle des familles de petites-salariés dans la ville de Québec*. Patterson, J. M., and McHenry, E. W.: A dietary investigation in Toronto families having incomes between \$1500-\$2400. Hunter, G., and Pett, L. B.: A dietary survey in Edmonton. *Canad. Pub. Health J.*, 1941, 32: 236.

# Canadian Journal of Public Health

## EDITORIAL BOARD

R. D. DEFRIES, M.D., D.P.H., *Editor*  
N. E. MCKINNON, M.B., AND J. T. PHAIR, M.B., D.P.H., *Associate Editors*  
R. L. RANDALL, *Assistant Editor*

A. MARGUERITE ARCHIBALD, M.D., D.P.H. GORDON BATES, M.D. A. E. BERRY, M.A.SC., C.E.,  
PH.D. J. CRAIGIE, M.B., CH.B., PH.D., D.P.H. J. G. CUNNINGHAM, B.A., M.B., D.P.H. C. E.  
DOLMAN, M.B., B.S., PH.D., D.P.H., M.R.C.P. D. T. FRASER, M.C., B.A., M.B., D.P.H., F.R.S.C.  
RONALD HARE, M.D. EDNA L. MOORE, REG.N. E. W. MCHENRY, M.A., PH.D. R. M.  
MACPHERSON, B.A., C.S.I.(C). G. D. PORTER, M.B. A. H. SELLERS, B.A., M.D., D.P.H. F. O.  
WISHART, M.A., M.D., D.P.H. J. WYLLIE, M.A., M.D., CH.B., B.S.C., D.P.H.

## THE TIMELINESS OF HEALTH INSURANCE PROPOSALS

THE question of the timeliness of introducing the current proposals for health insurance or otherwise expanding medical services has hardly been raised. That it has not received some prominence cannot be attributed to any lack of concern for the war on the part of those responsible for the proposals or on the part of the public; no one would question their complete devotion to the war effort. But, at first sight, it might seem to those not acquainted with the situation or to those Canadians engaged on the Italian front or spending their fourth or fifth year in the Army in England that the present time is not opportune for such proposals and that all thought and activity should be devoted exclusively to one objective and one only—the winning of the war in the shortest possible time—and it cannot be argued that the changes proposed are essential for the immediate prosecution of the war. Rather, it must be admitted frankly that the introduction of such proposals at the present time is timely, appropriate and necessary because of our way of life. The essence of democracy, as we have it, is that public opinion must rule. Public opinion may even take precedence over military necessity and govern military policy. So now, the force of public opinion demanding change in medical services is such that the demand must be met. "There is a tide in the affairs of man", and the tide in democracy is the favour of public opinion. Without that support, little or nothing is possible, but with that support, little is impossible. The present state of public opinion is the result of years of development, with the war accelerating and crystallizing that development. The principle has now been accepted by the public and the medical profession. Failure to take advantage of this favourable tide would not only be contrary to the practice of democracy, as we have it, but the loss of an opportunity to initiate change, recognized as necessary and desirable for the future welfare of Canada. The enactment of the necessary legislation, even if its full implementation must be postponed until later, will in no way interfere with the prosecution of the war but it will ensure the position for the post-war era.

This situation should be fully understood by those overseas. There are many there from the ranks of Canadian medicine and they are not all young. They have already made a contribution to the development of Canada; Canada is their country, perhaps theirs even more so than ours of the home front. They

made their stake here and, in going overseas, they left it here in our keeping. Their families and their family responsibilities are here. They look forward to returning here when no longer required for war, to resume the work they left. They are thus vitally concerned with any proposed changes. They have a right to feel that they are cogs, but not broken ones, in the wheel of change, that they have lost neither their responsibilities nor their privileges, and that these are not disregarded during their absence. Further, the rehabilitation of these men will require that they share responsibility for and play a definite part in any change. They should not come back to strange conditions which they cannot understand and in which they seem to have no place. For the country's sake as well as for theirs, they should be kept well in the picture and made fully acquainted with the situation. The Army is to be congratulated, therefore, on having arranged recently a liaison visit for this special purpose by a representative of the medical services overseas. Lieut.-Col. E. H. Botterill came and studied the situation at first hand. He brought with him the views and, let it even be called, the prejudices of the men of the Services overseas. After participating in committee and conference here, he concluded that such differences of opinion as did exist were more apparent than real and that the principles involved would receive a large measure of approval from the Overseas Medical Services. He will carry back to his confrères a detailed picture of the situation. He can assure them that many of those responsible for the proposals were in the front-line in the last war, that they are held here now not by any wish of their own, but by professional ties and circumstances beyond their control as they watch their sons going out to take their places in the field. These men have not forgotten their position, though as younger men, in the last war and they are not forgetting their confrères in this war. It is not only to the medical profession that Colonel Botterill will be able to explain the situation. In the Army overseas there are many with the deepest interest in social services; that is why they are there. They are anxious to understand and support any change for the social betterment of Canada. There are still more who are interested from the standpoint of future participants of the service and who will carry their share of the cost. Moreover, the Forces overseas, and those who follow them, will be the recruiting grounds from which personnel for the wider medical services must be obtained. It is to be hoped, therefore, that every effort will be made to keep not only the medical services, but the Forces as a whole, fully acquainted with these social developments in Canada and with the new fields envisaged in the proposed changes.

In the meantime, those who labour here on the plans and proposals must draw a large measure of encouragement from the fact that the British Ministry of Health has issued a White Paper outlining proposals for extending medical services to the full in the Old Country. This has received general approval, in spite of criticism of details. It is heartening on this the quiet side of the water to know that even under the shadow of invasion and counter-invasion, with bombs, barrage and fire their nightly portion, the leaders of medicine in England have found it possible to provide thus for the future.

# HOLDERS OF THE CERTIFICATE IN SANITARY INSPECTION (CANADA) C.S.I.(C.)

SINCE the examinations in sanitary inspection were introduced in 1935, two hundred and ninety-seven candidates have obtained the CERTIFICATE IN SANITARY INSPECTION (CANADA) granted by the Canadian Public Health Association. A complete list of the holders of the certificate is presented herewith in order that it may be available for reference by health departments.

- Alcock, Frederick Raymond, Vancouver, B.C., 1941  
Alexander, Lloyd G., Edmonton, Alta., 1942  
Allen, John Harold, Toronto, Ont., 1940  
Archambault, Joseph Fortunat René, Montreal, Que., 1939  
Armstrong, Linton William, Lachute, Que., 1939  
Armstrong, William James, Regina, Sask., 1941  
Badger, Franklin Thomas, Toronto, Ont., 1938  
Baker, Frederick, Winnipeg, Man., 1940  
Baker, Vernon Samuel, London, Ont., 1938  
Barker, Clifford Albert Victor, Macdonald College P.O., Que., 1943  
Barnett, Douglas George, Toronto, Ont., 1943  
Bastien, Wilfrid, Montreal, Que., 1941  
Batty, William Clement, Edmonton, Alta., 1937  
Beaton, Charles Cecil, Prince Albert, Sask., 1942  
Beaubien, L. Auguste, Nicolet, Que., 1938  
Beaulieu, Eudore, Chicoutimi, Que., 1942  
Belanger, Joseph Albert, Montreal, Que., 1936  
Belleau, François-Joseph, Montreal, Que., 1941  
Benoit, Victor, Montreal, Que., 1940  
Bereskin, Allan, Winnipeg, Man., 1943  
Bethel, Herbert Thomas Reginald, Regina, Sask., 1942  
Bibeau, Emmanuel, Montreal, Que., 1939  
Bishop, William Hunter, Toronto, Ont., 1940  
Black, William Murray, Vancouver, B.C., 1937  
Blacklin, Henry, Vancouver, B.C., 1936  
Blacklock, John Fielding, Hamilton, Ont., 1942  
Bond, Ziba, Toronto, Ont., 1936  
Bouchard, Albert, Montreal, Que., 1941  
Bouchard, Garcia, Montreal, Que., 1938  
Boucher, Armand, Montreal, Que., 1941  
Boucher, Paul, Montreal, Que., 1941  
Bownes, Hugh, Stettler, Alta., 1943  
Boyd, Robert, Todmorden, Ont., 1939  
Boyd, William Clarence, Todmorden, Ont., 1941  
Bridges, Wallace Roy, Winnipeg, Man., 1940  
Bruce, Norman Lewis, Calgary, Alta., 1942  
Brunelle, François, Montreal, Que., 1939  
Buckley, Gilbert, Toronto, Ont., 1939  
Burch, Charles Herbert William, Vancouver, B.C., 1939  
Carbonneau, Joseph Marc Aurèle, Montreal, Que., 1939  
Carmichael, John Stephen, Winnipeg, Man., 1941  
Casavant, Rudolphe Léon, Cookshire, Que., 1943  
Cavers, John Leonard, Toronto, Ont., 1936  
Cherry, Thomas Allen, Regina, Sask., 1942  
Chisholm, William Joseph, Glace Bay, N.S., 1940  
Clarey, Albert, Hamilton, Ont., 1937  
Clegg, Warren Leach, Hollyburn, B.C., 1937  
Clune, James, Galt, Ont., 1939  
Cockle, Arthur Boon, Vancouver, B.C., 1937  
Colling, Robert Arthur, Toronto, Ont., 1937  
Collins, Harry Percy, Vancouver, B.C., 1939  
Cooke, Albert Edward, Toronto, Ont., 1937  
Cox, Thomas P., Hamilton, Ont., 1938  
Covey, John, Calgary, Alta., 1937  
Craig, Robert Arthur, Winnipeg, Man., 1938  
Crichton, James Harold, Calgary, Alta., 1938  
Cross, Alexander, Winnipeg, Man., 1938  
Cross, Gordon Edward, Montreal, Que., 1938  
Curtis, Wilfrid A., Hamilton, Ont., 1939  
Daignault, J. Eugène, Montreal, Que., 1939  
Daniels, Howard, Winnipeg, Man., 1941  
Dennison, Harry, Toronto, Ont., 1937  
Desalliers, Philippe, Montreal, Que., 1941  
Desjardins, Jules Antoine, Montreal, Que., 1939  
Devine, Reginald Patrick, Vancouver, B.C., 1936  
Dicair, Arthur, Lachine, Que., 1935  
Disher, Dalton M., St. Catharines, Ont., 1941  
Dodgson, Lloyd I., Toronto, Ont., 1938  
Doidge, William George, London, Ont., 1938  
Downes, George Lewis, Toronto, Ont., 1937  
Drew, Harry, Windsor, Ont., 1941  
Drummond, James, St. Thomas, Ont., 1942  
DuBick, Nicolas Donald, Winnipeg, Man., 1942  
Dufresne, Joseph, Oka, Que., 1943  
Duncan, George James, Saint John, N.B., 1943  
Eastwood, Clarence John, Calgary, Alta., 1942  
Edwards, George Harold, Guelph, Ont., 1937  
Enman, Vernon, Vancouver, B.C., 1936  
Ewan, Morven, New Westminster, B.C., 1941  
Fairhurst, Stanley, Victoria, B.C., 1935  
Farrell, John James, Summerside, P.E.I., 1939

- Ferland, J. Robert, Montmagny, Que., 1943  
FitzSimons, William George, Toronto, Ont., 1943  
Flattery, Mark, The Pas, Man., 1938  
Fleetwood, Ernest Hall, Calgary, Alta., 1937  
Ford, Ellis Eric, Vancouver, B.C., 1941  
Ford, Robert George, Toronto, Ont., 1938  
Forget, Bertrand, Montreal, Que., 1941  
Forté, Louis-Georges, Montreal, Que., 1939  
Fournier, Sarto, Granby, Que., 1939  
Fox, Louis Samuel, Toronto, Ont., 1937  
Fuller, Joseph, Vancouver, B.C., 1937  
Fyfe, Oliver Simmons, Regina, Sask., 1937  
Garon, J. Roméo, Montreal, Que., 1940  
Gaudet, Paul, Montreal, Que., 1941  
Gaudette, Joseph Wilfrid, St. Hyacinthe, Que., 1938  
Gent, Ernest Clifford, Toronto, Ont., 1938  
George, Stanley William, Vancouver, B.C., 1936  
Gibbon, Harry Ray, Toronto, Ont., 1937  
Gibbons, Percy William, Saskatoon, Sask., 1940  
Gilbert, Ronald, Prince Albert, Sask., 1938  
Gompf, George Alfred, Hamilton, Ont., 1937  
Gonneville, Joseph Pierre Armand, Montreal, Que., 1939  
Goodwin, Bramwell Booth, Winnipeg, Man., 1940  
Goulding, Walter, Calgary, Alta., 1937  
Gracey, Alexander Albin, Vancouver, B.C., 1937  
Graham, David McKee, Winnipeg, Man., 1940  
Grant, Alexander Ewen, Brockville, Ont., 1942  
Grant, Allister, Sydney, N.S., 1939  
Gray, William, Toronto, Ont., 1939  
Griffith, Joseph L., Toronto, Ont., 1941  
Gropp, Elwood Stanley, Victoria, B.C., 1936  
Hammond, Maurice L., Toronto, Ont., 1940  
Hancey, Laurence H., Toronto, Ont., 1938  
Hardwick-Harding, Leonard, Toronto, Ont., 1943  
Harris, Sidney, Geraldton, Ont., 1938  
Harrison, Albert James, Toronto, Ont., 1936  
Hawksworth, Eric, Winnipeg, Man., 1938  
Heasman, Sidney Philip, Vancouver, B.C., 1936  
Henderson, James, Medicine Hat, Alta., 1937  
Henderson, Walter Graham, Moose Jaw, Sask., 1937  
Henderson-Watts, Henry George, Kelowna, B.C., 1936  
Herbison, Robert, Vancouver, B.C., 1942  
Hill, William Stanley, Toronto, Ont., 1936  
Hinton, Arthur Cowan, Vancouver, B.C., 1940  
Holmes, Albert Frank, Toronto, Ont., 1943  
Holmes, Charles Ross, Walkerville, Ont., 1938  
Homer, John Malcolm, Hamilton, Ont., 1937  
Hotchkis, Thomas Finlay, Amherst, N.S., 1943  
Hotté, Joseph Albert, Montreal, Que., 1939  
Huband, Charles Stanley, Ottawa, Ont., 1938  
Hughes, Ralph Philip, Ottawa, Ont., 1938  
Hunter, Louis John, East Kildonan, Man., 1937  
Ireson, Charles, Toronto, Ont., 1936  
Jackson, Reginald, Calgary, Alta., 1936  
Jackson, Thomas Henry, Toronto, Ont., 1935  
Jalbert, Raymond, Montreal, Que., 1943  
Jamieson, Hugh, Swift Current, Sask., 1935  
Johnson, Dudley George, Winnipeg, Man., 1938  
Johnston, Hugh John, Winnipeg, Man., 1941  
Johnston, James M., Toronto, Ont., 1939  
Jones, Harold Walter, Toronto, Ont., 1943  
Jones, Trevor Lloyd, Guelph, Ont., 1937  
Keirstead, William Percy, Moncton, N. B., 1936  
Kelly, George Wilfrid, Winnipeg, Man., 1939  
Kempa, William, Winnipeg, Man., 1942  
Kennedy, John Lawrence, Hamilton, Ont., 1938  
Kennedy, Mansell Harcourt, Moose Jaw, Sask., 1937  
Keown, Gordon Harry, Vancouver, B.C., 1938  
Kidson, Ernest Jack, Penticton, B.C., 1941  
Kindred, Robert William, Toronto, Ont., 1936  
Kinniston, Samuel Clarkson, Vancouver, B.C., 1937  
Lackie, Thomas Hall, Winnipeg, Man., 1940  
Lacombe, Gédéon, Grand'Mère, Que., 1939  
Lafond, Roland, Rosemount, Que., 1942  
Laliberté, Jean-Louis, Montreal, Que., 1942  
Lambert, Georges, Granby, Que., 1942  
Lapointe, Aldéric, Montreal, Que., 1939  
Lapointe, J. Emile, Ottawa, Ont., 1943  
Laroche, Philéas, Chicoutimi, Que., 1939  
Lavoie, Thomas Odilon, Montreal, Que., 1938  
Lawson, June, Winnipeg, Man., 1942  
Laxton, Nelson Roland, Toronto, Ont., 1938  
Lee, John Douglas, Vancouver, B.C., 1937  
Leggatt, William Albert, Calgary, Alta., 1937  
Lemieux, Charles André, Montreal, Que., 1941  
Lomax, Arthur Henry, Hamilton, Ont., 1937  
Love, Archibald Peter, Windsor, Ont., 1936  
Lund, Eric William, Toronto, Ont., 1940  
Lunn, Frederick Leighton, Mount Forest, Ont., 1944  
McCullough, Alexander, Vancouver, B.C., 1935  
McDonald, Alexander Williams, Toronto, Ont., 1935  
McDonald, Donald, Toronto, Ont., 1937  
McFaul, Harold Henderson, Toronto, Ont., 1940  
McIntyre, Hugh, Kirkland Lake, Ont., 1937  
McKee, David Samuel, Toronto, Ont., 1938  
Mackie, Angus Donald, Vancouver, B.C., 1941  
McLaughlin, Gordon Earl, Kamloops, B.C., 1939  
Macnab, Arthur Goudie, Mount Royal, Que., 1937  
MacPherson, Ronald Michael, Peterborough, Ont., 1938  
MacRae, John Harold, Prince Albert, Sask., 1941  
Mallett, Arthur William, Vancouver, B.C., 1939  
Mallett, Clifford, Vancouver, B.C., 1938  
Mardall, John Pinnock, Toronto, Ont., 1937  
Marier, Joseph Léon Robert, Quebec, Que., 1944



- Marson, William David, Toronto, Ont., 1936  
 Martel, Edgar, Montreal, Que., 1939  
 Martin, Arthur Thomas, Winnipeg, Man., 1938  
 Massé, Léopold, Montreal, Que., 1942  
 Matthews, Melville Francis, Toronto, Ont., 1936  
 Meehan, James, Timmins, Ont., 1939  
 Meredith, Robert Boyd, Grande Prairie, Alta., 1941  
 Miller, Thomas Gordon, Windsor, Ont., 1936  
 Milligan, William Alexander, Edmonton, Alta., 1943  
 Moisey, William Alexander, Edmonton, Alta., 1939  
 Mooney, John Charles, Calgary, Alta., 1936  
 Moore, David Ernest, Kenora, Ont., 1940  
 Moore, Francis Albert, Toronto, Ont., 1944  
 Moore, Robert Lionel, Toronto, Ont., 1938  
 Moreau, Charles, St. Anselme, Que., 1941  
 Morrell, John Fordham, Vancouver, B.C., 1941  
 Muller, Cyril Gustave, St. Boniface, Man., 1937  
 Murphy, Patrick Henry, South Porcupine, Ont., 1943  
 Murray, John Albert  
 Navion, Wilfrid, Ottawa, Ont., 1939  
 Neill, Thomas, Toronto, Ont., 1936  
 Newall, Percy Swain, Saskatoon, Sask., 1940  
 Nixon, Murray Charles, Toronto, Ont., 1941  
 Noël, Léo, Montreal, Que., 1942  
 O'Hanley, John, Hamilton, Ont., 1938  
 O'Hara, Alexander Stuart, Kenora, Ont., 1935  
 Osborne, William John Earl, Windsor, Ont., 1936  
 Owen, Owen William, Toronto, Ont., 1938  
 Paddon, John Reginald, Vancouver, B.C., 1941  
 Paquin, Jean, St. Eustache, Que., 1942  
 Paré, Joseph Avila, Montreal, Que., 1939  
 Payette, Peter J., Cornwall, Ont., 1939  
 Peers, Arthur Ross, North Vancouver, B.C., 1939  
 Pengelly, Norman Edward, New Westminster, B.C., 1938  
 Perry, Arthur, Regina, Sask., 1942  
 Peters, Francis Paul, Regina, Sask., 1943  
 Peters, Isaac, Winnipeg, Man., 1942  
 Pettipas, Charles Thomas, Dartmouth, N.S., 1935  
 Peturrson, Olafur Bjorn, Winnipeg, Man., 1942  
 Picard, Marcel, L'Epiphanie, Que., 1942  
 Picton, Ernest James, Hamilton, Ont., 1937  
 Pillidge, Wallace, Calgary, Alta., 1936  
 Pillidge, Wallace, Calgary, Alta., 1937  
 Pilotte, Charles, Montreal, Que., 1942  
 Powell, Edgar Ernest Charles, Edmonton, Alta., 1937  
 Powell, George Hunter, Toronto, Ont., 1938  
 Proud, John Ellis Wilson, Vancouver, B.C., 1937  
 Pye, Sydney, Toronto, Ont., 1939  
 Pym, Walter James, Regina, Sask., 1942  
 Racklin, Lawrence L., Winnipeg, Man., 1939  
 Rancourt, Joseph Odilon, Montreal, Que., 1941  
 Reed, William Ceary Nelles, Regina, Sask., 1937  
 Reid, John Henry, Calgary, Alta., 1936  
 Reusch, Harold Percy, Vancouver, B.C., 1940  
 Richards, Eric Herbert, Calgary, Alta., 1940  
 Rigby, Edward Johnstone, Winnipeg, Man., 1942  
 Rink, Jack Cornelius, Regina, Sask., 1943  
 Roberts, Albert, Regina, Sask., 1937  
 Roberts, Dorothy Grace, Winnipeg, Man., 1943  
 Robertson, Laurence Edward, Vancouver, B.C., 1937  
 Robitaille, Raymond John, Montreal, Que., 1939  
 Roger, Paul, Montreal, Que., 1943  
 Rogers, George Alexander, Vancouver, B.C., 1936  
 Rose-Christensen, I., Winnipeg, Man., 1941  
 Ross, Alexander Robert, Meadowville, N.S., 1943  
 Rothery, Frank, Sudbury, Ont., 1939  
 Ruggles, Arthur Edwin, Toronto, Ont., 1936  
 Ruggles, Robert Walter, Toronto, Ont., 1936  
 Sadoway, Donald, Toronto, Ont., 1939  
 Saint-Georges, Jacques, Montreal, Que., 1942  
 Shain, Aubrey Charles, Hamilton, Ont., 1937  
 Sharp, Harold, Toronto, Ont., 1938  
 Shaw, Ian Douglas Frank, Edmonton, Alta., 1943  
 Shorrock, Walter Walmsley, Vancouver, B.C., 1939  
 Shutt, Donald Bethune, Guelph, Ont., 1938  
 Sitler, Arthur Leslie, Saskatoon, Sask., 1944  
 Skinner, Robert, Vancouver, B.C., 1936  
 Slaght, Lorne, Winnipeg, Man., 1937  
 Smith, Harry Alvin, Broadview, Sask., 1944  
 Smith, James Ketchener, Vancouver, B.C., 1936  
 Smith, William Lapslie, Toronto, Ont., 1938  
 Southen, Edwin John, North Vancouver, B.C., 1938  
 Southon, Edgar Gilbert, Swift Current, Sask., 1935  
 Stanley, Ernest Victor, Calgary, Alta., 1938  
 Staples, Wilfrid Charles, Toronto, Ont., 1938  
 Startup, Reginald, Vancouver, B.C., 1936  
 Steiman, Manley Manuel, Winnipeg, Man., 1940  
 Stonehouse, Claude Randall, North Vancouver, B.C., 1941  
 Stringer, John Alfred, Vancouver, B.C., 1939  
 Stringer, Russell Irvine, Vancouver, B.C., 1941  
 Sutherland, James Walter, Toronto, Ont., 1942  
 Sutton, Charles Edward, Moose Jaw, Sask., 1937  
 Taylor, Elmore Dixon, Brantford, Ont., 1939  
 Taylor, Thomas Nicholas, Vancouver, B.C., 1938  
 Taylor, Wilfred, Winnipeg, Man., 1937  
 Thompson, Albert William, Kingston, Ont., 1943  
 Tyler, Herbert George, Toronto, Ont., 1937  
 Van Engel, Conrad Évert, Winnipeg, Man., 1937

Veilleux, Joseph B., Beauceville, Que., 1941  
 Voaden, Carl Bale, St. Thomas, Ont., 1943  
 Waghorn, Thomas George, Brockville, Ont., 1938  
 Wallace, William C., Kingston, Ont., 1939  
 Wattam, Clare Elson, Toronto, Ont., 1936  
 Weis, Jacob Edward, Stratford, Ont., 1935  
 Welsh, Milford A., Swift Current, Sask., 1941  
 Welsh, Robert Edward, Toronto, Ont., 1940

Westover, William George, Weston, Ont., 1940  
 Widdup, Arthur, Hamilton, Ont., 1937  
 Witherspoon, Robert Wilfrid, Hamilton, Ont., 1939  
 Wood, Donald James, Peterborough, Ont., 1938  
 Wookey, William Stanley, Vancouver, B.C., 1941  
 Young, Gordon Thomas, London, Ont., 1939

## Books

### **The Principles and Practice of Medicine.**

Originally written by Sir William Osler, Bart., M.D., F.R.C.P., F.R.S. Revised by Henry A. Christian, M.D., A.M., LL.D., (Hon.) Sc.D., Hon. F.R.C.P. (C.), F.A.C.P. Clinical Professor of Medicine, Tufts College Medical School; Visiting Physician, Beth Israel Hospital, Boston; Hersey Professor of the Theory and Practice of Physic, Emeritus, Harvard University; Physician-in-Chief, Emeritus, Peter Bent Brigham Hospital, Boston. Fifteenth Edition. New York: D. Appleton-Century Company, Inc. Toronto: The University of Toronto Press, 1944. 1498 pages. \$9.50.

THE fifteenth edition of *The Principles and Practice of Medicine*, originally written by Sir William Osler, has been published less than two years after the fourteenth edition. In the preface, Dr. Christian states:

"The present tempo of medical progress, particularly that in therapy, is such that in order to give to students and practitioners of medicine needed knowledge, changes and additions in the descriptions of numerous diseases should be made at short intervals, and newly recognized syndromes and diseases should be discussed. War activities have accentuated this need. In army and navy activities with great numbers of men coming in close contact with each other contagious diseases increase their incidence, and the possibility of extensive epidemics grows; this increases the importance of prophylaxis and treatment of diseases of this nature as well as making of the utmost importance the quick recognition of them. The knowledge of how to use newly developed drugs correspondingly enhances in importance."

The volume therefore presents the most recent tried and proven methods of diagnosis, prophylaxis and treatment of so-called tropical as well as non-tropical diseases. The first

edition of this Practice of Medicine was written fifty-one years ago by Sir William Osler while he was physician-in-chief of the Johns Hopkins Hospital in Baltimore. Revisions were made by him, and following his death in 1919 the work was continued by Thomas McCrae, who revised the tenth, eleventh and twelfth editions. In 1938 the thirteenth edition was revised by Dr. Henry Christian, and to him physicians everywhere are indebted for continuing the tradition of this book, being responsible for the thirteenth, fourteen and fifteenth editions. Osler's *Principles and Practice of Medicine* has achieved world-wide recognition and is established as a great work on medicine. It is accepted as the most authoritative and up-to-date presentation of the principles and practice of medicine.

R. D. Defries

### **Holt's Care and Feeding of Children.**

By L. Emmett Holt, M.D. Revised by L. Emmett Holt, Jr., M.D. Associate Professor of Pediatrics, Johns Hopkins University; Associate Pediatrician, Johns Hopkins Hospital, Baltimore, Md. New York: D. Appleton-Century Company, 1943. 321 pages. \$2.00 (U.S. funds).

THIS book was originally written by L. Emmett Holt and has been revised and enlarged by L. Emmett Holt Jr. The book is an excellent addition to the literary needs of a mother who is raising a young family. The contents and subject matter are very complete. The information is presented by a question, which is then very thoroughly answered by the author. For the various problems connected with the care, development, feeding, behaviour problems and common ailments of infancy and childhood this book is an excellent aid to mothers.

Nelles Silverthorne

